MONTHLY WEATHER REVIEW.

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INTRODUCTION.

The MONTHLY WEATHER REVIEW for November, 1902, is based on reports from about 3,100 stations furnished by employees and voluntary observers, classified as follows: Regular stations of the Weather Bureau, 160; West Indian service stations, 17; special river stations, 132; special rainfall stations, 48; voluntary observers of the Weather Bureau, 2,562; Army post hospital reports, 18; United States Life-Saving Service, 9; Southern Pacific Company, 96; Hawaiian Government Survey, 75; Canadian Meteorological Service, 33; Jamaica Weather Service, 130; Mexican Telegraph Service, 20; Mexican voluntary stations, 7; Mexican Telegraph Company, 3; Costa Rican Service, 7. International simultaneous observations are received from a few stations and used, together with trustworthy newspaper extracts and special reports.

Special acknowledgment is made of the hearty cooperation of Prof. R. F. Stupart, Director of the Meteorological Service of the Dominion of Canada; Mr. Curtis J. Lyons, Meteorologist to the Hawaiian Government Survey, Honolulu; Señor Manuel E. Pastrana, Director of the Central Meteorological and Magnetic Observatory of Mexico; Camilo A. Gonzales, Director-General of Mexican Telegraphs; Capt. S. I. Kimball, Superintendent of the United States Life-Saving Service; Lieut. Commander W. H. H. Southerland, Hydrographer, United States Navy; H. Pittier, Director of the Physico-Geographic Institute, San Jose, Costa Rica; Capt. François S. Chaves, Director of the Meteorological Observatory, Ponta Delgada, St. Michaels, Azores; W. M. Shaw, Esq., Secretary, Meteorological Office, London; and Rev. Josef Algué, S. J., Director, Philippine Weather Service; and H. H. Cousins, Chemist, in charge of the Jamaica Weather Office.

Attention is called to the fact that the clocks and self-registers at regular Weather Bureau stations are all set to seventy-fifth meridian or eastern standard time, which is exactly five hours behind Greenwich time; as far as practicable, only this standard of time is used in the text of the REVIEW, since all Weather Bureau observations are required to be taken and recorded by it. The standards used by the public in the United States and Canada and by the voluntary observers are believed to conform generally to the modern international system of standard meridians, one hour apart, beginning with Greenwich. The Hawaiian standard meridian is 157° 30′, or $10^h\ 30^m$ west of Greenwich. The Costa Rican standard of time is that of San Jose, $0^h\ 36^m\ 13^s$ slower than seventy-fifth meridian time, corresponding to $5^h\ 36^m$ west of Greenwich. Records of miscellaneous phenomena that are reported occasionally in other standards of time by voluntary observers or newspaper correspondents are sometimes corrected to agree with the eastern standard; otherwise, the local standard is mentioned.

Barometric pressures, whether "station pressures" or "sea-level pressures," are now reduced to standard gravity, so that they express pressure in a standard system of absolute measures.

FORECASTS AND WARNINGS.

By Prof. E. B. GARRIOTT, in charge of Forecast Division.

Unusually stormy weather prevailed over the North Atlantic Ocean during November, 1902. On the British coast gales prevailed from the 5th to the 12th and during the last decade of the month. Three storms of marked strength moved eastward over Newfoundland from the 23d to the 28th. The gales that began on the west coast of the British Isles on the 5th attended the passage of a storm that appeared over the Caribbean Sea on the morning of October 31. This storm passed northeastward over Santo Domingo during November 1, and advanced thence northeastward over the Atlantic with a gradual increase in intensity. On October 31 the following message was telegraphed West Indian Weather Bureau stations from San Juan, Porto Rico, to Havana, Cuba, and to coast Weather Bureau stations from New Orleans, La., to Boston, Mass.:

Evidence of a disturbance south of eastern Cuba which may develop strength and move northward. Not considered safe for vessels to leave Cuban ports or to sail for Cuban waters during the next twenty-four hours.

On November 1, the same disposition was made of the following message:

Center of disturbance moving northeastward over Santo Domingo. No indication of hurricane in the West Indies, but strong north to northeast winds will prevail over the ocean north of the West Indies and off the United States coast.

The observatory at Horta, Fayal, Azores, was cabled as follows:

Disturbance moving northeastward from the West Indies. Unsettled, stormy weather indicated over middle and western Atlantic next few days.

The following message was cabled to Lloyds, London:

Westward bound vessels will experience strong north to northeast winds, and possibly severe gales.

The storm referred to apparently moved northeastward over the Atlantic Ocean, and its approach to European waters was indicated on the morning of the 5th by reports from the British Isles.

On the 23d, Lloyds, London, was cabled as follows:

Storm of marked strength moving eastward over Newfoundland will probably be met by westward bound steamers.

This information was also telegraphed to Boston, New York, and Philadelphia for the information of transatlantic shipping interests. Exceptionally severe gales were encountered by transatlantic steamers during the closing days of November.

The storms of the month were not of marked severity on the immediate coasts and Great Lakes of the United States. From the 7th to the 10th a disturbance moved northeastward from off the Florida coast to Newfoundland, which developed considerable strength when off Hatteras. A squadron of United States warships that sailed from Fort Monroe, Va., November 5 for Culebra Island, West Indies, encountered a gale southeast of Cape Hatteras, during which two coal barges were lost. On the 25th and 26th a storm that had advanced

from the Rio Grande Valley caused gales along the middle Atlantic and New England coasts.

Three disturbances that first appeared over the west part of the Gulf of Mexico moved northeastward to the Great Lakes, and one of these was the storm before referred to as having moved eastward over Newfoundland on the 23d.

Several vessels were lost on the Great Lakes during the third decade of the month. On the night of the 23d the steamer *Sylvanus J. Macy* sprung a leak off Point Burwell, Ontario, and sank. On the 25th the steamer *Quito* ran ashore in a northeast gale, while trying to make the harbor at Lorain, Ohio. During the night of the 29th the steamer *Charles Hebard* was wrecked at Point Mamainse, Lake Superior.

A number of barometric depressions appeared on the north Pacific coast, notable among which were those of the 8–10th, and 16–18th. The storm of the 16–17th was particularly severe, and a number of expressions of appreciation have been received regarding the value to shipping interests of the warnings issued in connection therewith.

Ample warnings were issued of all storms that visited the Atlantic, Pacific, and Gulf coasts and the Lake region.

The first important cold wave of the season swept southward and eastward from the British Northwest Territory over the interior of the country from the 26th to the 28th, carrying the line of freezing temperature almost to the coast line of the Gulf of Mexico. Timely warning was given to all interests that were subject to damage or loss by frost and cold. The following comment is made by the New Orleans press on the warnings issued for the Gulf district, the only section east of the Pacific coast States in which agricultural products were endangered by frost:

The Times-Democrat of November 28, 1902:

> The warnings sent out by Dr. Cline Wednesday morning were timely for all parts of this extensive district. Freezing weather occurred over Arkansas, Oklahoma, and northwest Texas. Heavy frosts occurred over the interior of Texas, and frost occurred generally over southern Texas and all of Louisiana. Frost was in evidence in New Orleans, and on the outskirts was quite heavy. The warnings of these severe conditions were issued by the Weather Bureau well in advance, and all business interests were prepared for the frosts and freezing.

The Daily Picayune of November 29, 1902:

> This season's special forecasts were inaugurated Wednesday by the forwarding of frost warnings to every station in the west Gulf district, with the result that planters and farmers, relying implicitly upon Dr. Cline's forecasts, which were so accurate in past seasons, had time to protect their crops from the low temperatures. This warning, in ample time, was a thanksgiving offering to southern industrial and agricultural interests, and its value can hardly be estimated in cold cash.

From the 25th to the 30th frost was general in California. The frosts of this period, and also the rains of the month were covered by forecasts and special warnings issued from San Francisco.

During the third decade of the month heavy rains caused destructive freshets in eastern Texas, and large areas of bottom lands along the Red River above Shreveport were inundated. The floods in the Red River continued into December, and will be referred to in the MONTHLY WEATHER REVIEW for that month.

BOSTON FORECAST DISTRICT.

The weather was remarkable for unusual mildness and light precipitation. The storms of the 8–9th and 25–26th were of marked severity, with heavy easterly gales. The latter storm was the most severe of the season. All warnings were timely, and called forth most favorable comment.—*J. W. Smith, Forecast Official.*

NEW ORLEANS FORECAST DISTRICT.

Warnings for cooler, brisk to high northerly winds over eastern Mexico, and northwest storm warnings for the west Gulf coast were issued on the 26th, and cold, high winds followed. Warnings were issued on the 26th for freezing weather in northern part of the district and frost to the coast line, and the first general frost (killing throughout the interior) occurred on the morning of the 27th. Press comments regarding the warnings have been forwarded.—*I. M. Cline, Forecast Official.*

CHICAGO FORECAST DISTRICT.

Storm warnings were displayed on the upper Lakes at frequent intervals during the month, and evidently vessel masters took necessary precautions. No very severe storms occurred, but there were some casualties. The Canadian steamer *Bannockburn* left Port Arthur, Ont., on November 21, and no trace of her has yet been found. She undoubtedly foundered in one of the storms that followed soon after sailing. It is probable, however, that at no time the steamer came within range of the storm warning stations of this service. The other important casualties were the loss of the steamer *Hebard*, and one of her consorts, on Lake Superior the night of the 29th. During the storm the steamer had parted from her consorts, and in the high wind and snow the captain lost his bearings and found himself on the breakers near Point Mamainse. The crew were rescued the next day, but the boat went to pieces on the rocks. The *Hebard* was a wooden steamer and her business of towing barges during the stormy season was extremely hazardous. It would seem that the captain of such craft should pay particular attention to the daily forecasts and storm warnings. All vesselmen that could be reached were fully advised as to the approach of the storm in which these boats were wrecked.—*H. J. Cox, Professor.*

DENVER FORECAST DISTRICT.

Unsettled weather characterized November, but cold waves were notably few, unimportant, and local in character. A feature of the month was the heavy precipitation that occurred in Arizona, especially in connection with the low area, central in Wyoming on the morning of the 19th, which took a southwestward course to Arizona where it remained for several days. The snowfall was very heavy in northern Arizona.—*F. H. Brandenburg, Forecast Official.*

SAN FRANCISCO FORECAST DISTRICT.

Unusually heavy rainfalls occurred in the northern portion of California on November 8 and 9. At Eureka the 24-hour rainfall was 3.16 inches, and at Red Bluff, 2.26 inches. At the latter point the rainfall in forty-eight hours amounted to 4.46 inches. The forecasts of rain throughout California were handsomely verified, and wherever fruit was injured the loss was due to causes beyond the control of the orchardists. Ample warning was given at nearly all points. A second stormy period began November 13, but did not cause unusual weather conditions south of San Francisco. Southwest storm warnings were ordered from San Francisco to Eureka at noon November 18, and a few hours later the warnings were extended southward to Santa Barbara, and advisory messages were sent to Los Angeles and San Diego. By the evening of the 19th rain had fallen as far south as San Diego. A peculiar feature of the disturbance was the excessive rainfall in southeastern California, the valley of the Colorado, and Arizona. In the latter territory rain or snow fell several days, the snowfall in the northern portion being unusually heavy. Light to heavy frosts occurred generally in California on November 25, and subsequent mornings.—*A. G. McAdie, Professor.*

PORTLAND, OREG., FORECAST DISTRICT.

Although wet and stormy the month was not unseasonably

cold. The reports from the new stations at North Head and Tatoosh Island were of great value in giving early information of approaching storms, and no storms entered the district without ample warning having been sent to marine interests. Shipping was badly hampered by gales, but no serious casualties occurred.—*E. A. Beals, Forecast Official.*

AREAS OF HIGH AND LOW PRESSURE.

Movements of centers of areas of high and low pressure.

Number.	First observed.			Last observed.			Path.		Average velocity.	
	Date.	Lat. N.	Long. W.	Date.	Lat. N.	Long. W.	Length.	Duration.	Daily.	Hourly.
High areas.		°	°		°	°	*Miles.*	*Days.*	*Miles.*	*Miles.*
I	31, p. m.*	41	124	3, a. m..	37	97	1,500	2.0	750	31.2
II	4, p. m..	53	108	9, a. m..	46	60	3,150	4.5	700	29.2
III	9, p. m..	53	108	11, p. m..	41	72	1,900	2.0	950	39.6
IV	12, a. m..	53	105	13, a. m..	44	100	650	1.0	650	27.1
V	12, a. m..	45	123	13, a. m..	44	100	1,125	1.0	1,125	46.9
VI	{14, p. m..	45	118{	20, a. m..	42	75	{ 3,400	5.5	618	25.8
	{15, a. m..	50	100{				{ 2,875	5.0	575	24.0
VII	21, a. m..	47	123	24, a. m..	34	78	2,600	3.0	867	36.1
VIII	24, p. m..	45	123	29, p. m..	41	70	3,500	5.0	700	29.2
IX	28, p. m..	43	103	30, p. m..	39	82	1,750	2.0	875	36.5
Sums							22,450	31.0	7,810	325.6
Mean of 10 paths							2,245		781	32.6
Mean of 31.0 days									724	30.2
Low areas.										
I	1, a. m..	38	105	3, p. m..	48	68	2,000	2.5	800	33.3
II	2, a. m..	51	120	4, p. m..	46	85	1,650	2.5	660	27.5
III	3, p. m..	29	95	7, a. m..	47	65	2,200	3.5	629	26.2
IV	6, p m..	51	120	8, p. m..	49	86	1,800	2.0	900	37.5
V	10, p. m..	41	112	15, p. m..	48	68	3,275	5.0	655	27.3
VI	12, a. m..	47	96	13, p. m..	45	80	900	1.5	600	25.0
VII	14, a. m..	35	112	{18, a. m..	42	80	{ 2,350	4.0	588	24.5
				{18, p. m..	35	75	{ 2,550	4.5	567	23.6
VIII	23, p. m..	32	107	28, p. m..	46	60	3,175	5.0	635	26.5
IX	{26, p. m..	53	114{	30, p. m..	46	60	{ 2,550	4.0	638	26.6
	{27, p. m..	38	105{				{ 2,450	3.0	788	32.8
Sums							24,900	37.5	7,460	310.8
Mean of 11 paths							2,264		678	28.2
Mean of 37.5 days									664	27.7

*October.

For graphic presentation of the movements of these highs and lows see Charts I and II.—*Geo. E. Hunt, Chief Clerk, Forecast Division.*

RIVERS AND FLOODS.

The occurrences of interest in connection with the river work of the month were but three; 1, the formal opening of the New England branch of the River and Flood Service; 2, the floods in the Southwest; and 3, the moderate flood in the upper Sacramento Valley.

The New England River and Flood Service was established at the urgent request of the business interests of that section in the hope that, after a series of observations had been made, some system might be devised whereby warnings of approaching floods, ice gorges, etc., could be given a sufficient time in advance to admit of the removal of property to places of safety, and of the application of any preventive measures that might be found to be practicable. The headquarters of the new service are located at Boston, and following are the names of the stations established; they were selected after a personal inspection of the entire territory and a due consideration for all interests likely to be affected at any time.

PENOBSCOT RIVER.

River stations.	*Rainfall station.*
Mattawamkeag, Me.	Millinocket, Me.
Montague, Me.	
Bangor, Me.	

KENNEBEC RIVER.

River stations.	*Rainfall stations.*
Solon, Me.	Kineo, Me.
Winslow, Me.	Jackman, Me.

MERRIMAC RIVER.

River stations.	*Rainfall station.*
Franklin Junction, N. H.	Plymouth, N. H.
Concord, N. H.	
Manchester, N. H.	

CONNECTICUT RIVER.

River stations.	*Rainfall stations.*
Wells River, Vt.	West Stewartstown, N. H.
White River Junction, Vt.	North Stratford, N. H.
Bellows Falls, Vt.	
Holyoke, Mass.	
Hartford, Conn.	

HOUSATONIC RIVER.

River station.	*Rainfall station.*
Gaylordsville, Conn.	Pittsfield, Mass.

This service will be maintained from November to April, inclusive, of each year, with a special service during the remaining months whenever necessary.

The floods in Texas and in the Red River Valley were due to the persistent heavy rains of the latter half of the month over the territory affected. The great extent of the Texas and Indian Territory floods is not at all indicated by the stages of the water in the larger rivers. They were comparatively, though not extremely, high, the Trinity River leading, but the rains were so frequent and excessive that the whole country became saturated with water. Lakes, ponds, and small streams were entirely filled and overflowed their banks, and the ground became burdened with water. In some portions of the districts affected the rains appear to have been more of a benefit than a detriment, while in others the reverse was true. The greatest sufferers were the railroads. Culverts and bridges were washed away, and many miles of tracks settled in the soft ground, necessitating vexatious delays and frequently the entire abandonment of train service. Some late cotton was ruined and quite a number of cattle were drowned in the bottom lands.

The Red River flood was still increasing at the end of the month, and it will be the subject of a special report in the WEATHER REVIEW for December, 1902.

The flood in the upper Sacramento Valley was caused by the heavy rains of the 8th and 9th. At Red Bluff, Cal., the river was out of its banks on the 9th, and warnings were sent to the lower river points to move stock and portable property to higher ground. The maximum stage reached at Red Bluff was 24.2 feet, 1.2 feet above the danger line. The rise was not prolonged, and by the 13th the water had fallen below the 6-foot mark.

Navigation on the Tennessee River above Florence, Ala., was resumed on the 26th after a suspension of over five weeks. Over the remaining navigable rivers conditions did not materially change.

Very little ice has thus far been reported. At Moorhead, Minn., the Red River of the North was frozen over in places on the 12th, and remained so at the close of the month.

The highest and lowest water, mean stage, and monthly range at 156 river stations are given in Table VII. Hydrographs for typical points on seven principal rivers are shown on Chart V. The stations selected for charting are Keokuk, St. Louis, Memphis, Vicksburg, and New Orleans, on the Mississippi; Cincinnati and Cairo, on the Ohio; Nashville, on the Cumberland; Johnsonville, on the Tennessee; Kansas City, on the Missouri; Little Rock, on the Arkansas; and Shreveport, on the Red.—*H. C. Frankenfield, Forecast Official.*

CLIMATE AND CROP SERVICE.

By JAMES BERRY, Chief of Climate and Crop Service Divison.

The following summaries relating to the general weather and crop conditions during November are furnished by the directors of the respective sections of the Climate and Crop Service of the Weather Bureau:

Alabama.—The light yield of cotton was somewhat augmented by very favorable weather of first two decades, which matured much of the second growth and top crop, though all growth was stopped by the first general killing frost and freeze of autumn, which swept over the State on the 27th and 28th; some outstanding cotton was damaged by general and heavy to slightly excessive rains of last decade, which retarded all farm work, but benefited recently sown oats and wheat.—*F. P. Chaffee.*

Arkansas.—Temperature and rainfall considerably above normal; first general killing frost occurred on the 27th. All late crops made good growth and yielded well. Cotton picking progressed rapidly and was nearly completed in the northern counties and in some localities in other sections. Cotton made favorable progress; the yield will be greater than at first anticipated. Wheat sowing progressed rather slowly, except in the northwest; comparatively little had been sown in central and southern and a reduced acreage in the northeastern section. Wheat and oats germinated well and made rapid growth; a few report damage by the hessian fly.—*Edward B. Richards.*

Arizona.—November was a rather cool month, especially during the latter half. Quite heavy rains and snows fell over most of the territory during the early part of the third decade. These rains have greatly benefited the ranges, except in a few localities, and stock is now generally doing well. Orange picking began the latter part of the month, but the crop is rather light.—*M. E. Blystone.*

California.—Abnormally cool weather prevailed during the month, retarding to some extent the growth of grass and early sown grain. Severe frosts occurred in many places, but caused no material damage. The rainfall was above average in nearly all sections, notably in the central and northern districts, and greatly benefited all growing crops and pasturage. The overflow of creeks and rivers in some of the northern districts caused slight damage to late crops.—*Alexander G. McAdie.*

Colorado.—The month averaged warmer than normal east of the mountains and over a considerable area on the western slope. The precipitation was unevenly distributed. It was somewhat greater than normal over areas in the extreme western part of the State and generally along the eastern foothills, while a marked deficiency was noted along the eastern and southern borders and in the central mountain region.—*F. H. Brandenburg.*

Florida.—The month, as a whole, has been quite favorable for farm work. The remaining cotton was picked and the last of the corn crop housed. The sweet potato crop improved very much; the crop at one time promised to be very short, but favorable temperatures have done much toward making the crop a normal one. Good progress was made by truckers, except over detached sections, where local heavy rains did some damage to seed beds. Strawberries are making fair progress. Citrus fruits, pineapples, and vegetables are being shipped in moderate quantities.—*A. J. Mitchell.*

Georgia.—A remarkably mild month for the season, the mean temperature for many stations being 5° to 7° in excess of the normal. But few Novembers in the past quarter of a century have been warmer than, or so warm as, this one. Practically no freezing weather occurred until the extreme latter portion of the month. The first general killing frost of the season occurred on the 28th. The average rainfall was about one inch greater than normal. Fall wheat and oats are in good condition.—*J. B. Marbury.*

Idaho.—November was remarkable for heavy falls of snow on all the mountains of the State. At the close of the month the snow on the mountains above 5,500 feet exceeded the accumulated depth for the winter of 1901–2. Heavy rains fell over the winter stock ranges, assisting the growth of grass somewhat, but came too late to cause a material improvement.—*S. M. Blandford.*

Illinois.—The month was very warm, and the rainfall slightly above the normal and well distributed. The work of securing the corn crop continued under satisfactory conditions, and though there were some further reports of molding of the corn in shock, the crop was put up in good condition. Wheat and rye made rapid and healthy growth, and both are reported to be in exceptionally good condition to stand severe winter weather. Some injury to early sown wheat by hessian fly was reported in the southern portion of the State, but the spread of this insect seems to have been checked during the latter half of the month.—*Leon J. Guthrie.*

Indiana.—Weather conditions were exceptionally favorable to fall sown grains; wheat sown prior to September 25 was damaged by flies, but bulk of corn planted after that date made good growth and was in excellent condition for winter. Husking and shredding corn in shock made fair progress, but gathering from the stalk and cribbing was retarded by dampness. Pastures continued to furnish good grazing, and live stock was in good condition.—*W. T. Blythe.*

Iowa.—The month was warmer than usual, with excessive cloudiness and moisture. Corn gathering was retarded by wet fields, and conditions not generally favorable for cribbing. At close of month more than the usual amount was unharvested. Pasturage excellent; conditions favorable for plowing dry upland fields; potato crop generally secured in good condition. Reports indicate about 53 per cent of corn soft and unmarketable except for immediate feeding.—*John R. Sage.*

Kansas.—Wheat in fine condition, good stand, good color, and growing well, except that early sown wheat in southeastern counties is being injured by fly; has begun to stool in some northern and is being pastured in some southern counties. Wet weather has interfered, in a measure, with gathering corn, and with its hardening for the sheller. Some late hay and some cane hay spoiled by the wet weather.—*T. B. Jennings.*

Kentucky.—The weather was very favorable for winter wheat, rye, and oats, and at the end of the month these crops were in excellent condition. There was some complaint of damage by hessian fly, but the area affected is small. Fall pasturage is fine, and stock of all kinds is in very good condition. Tobacco has cured up well and was in good condition for handling during the latter part of the month. Corn shucking progressed well.—*H. B. Hersey.*

Louisiana.—With the exception of heavy rains on the 4th, the weather during the first half of the month was favorable for maturing and gathering the remainder of the cotton crop. During the last fifteen days showery weather interfered with picking. A general killing frost occurred in the cotton-growing parishes on the 27th, which stopped the growth and development of the plant. The greater part of the month was so warm that sugar cane did not ripen well, but the weather was generally favorable for grinding; cool weather at the end of the month was very favorable for the crop.—*I. M. Cline.*

Maryland and Delaware.—Unusually mild temperatures, with sufficient rainfall, favored all growth. Flowers blooming in parts of interior and south, some fruit trees in leaf and blossom, raspberries and strawberries giving second crops, and protected tomato vines continuing light yields, until frosts of 29th. Wheat and fall sown grasses well rooted, but considerable fly in early wheat. Corn husking well advanced, but too warm to dry the ears properly. Tobacco cured nicely, except for hurtful periods of foggy weather. Pasturage good.—*Oliver L. Fassig.*

Michigan.—November was generally very favorable for winter wheat, which at the close of the month was in good condition, showing a healthy top of good color and fair size. Correspondents' reports indicated a decreased acreage and some hessian fly in the early sown wheat. Generally, wheat was sown quite late this year on account of the rainy weather that prevailed about the time the crop is usually sown. Much corn still remained in the fields because it was not fit to crib.—*C. F. Schneider.*

Minnesota.—No zero temperatures during the month, except at some northern points. Some snow fell in northern portions, and there was snow in parts of the south on the 14th and 15th and after the 25th. Shallow lakes in southern portions were not frozen till late in the month, and deep ones were still open at its close. Plowing was being done in the south till the 29th. Pastures were green and furnished feed nearly all the month. There is still some thrashing to do, but stacks are damp.—*T. S. Outram.*

Mississippi.—The month was very warm, having the highest November mean temperature on record. The first half was uniformly mild and pleasant, with but little rainfall, while during the latter half much cloudiness prevailed, and heavy rains were general on the 24th and 25th, followed by much colder weather with snow flurries in the northern counties on the 27th. On the 28th freezing temperatures occurred, except in the extreme southern counties.—*W. S. Belden.*

Missouri.—Except in portions of the northwest section, the mean temperature of the month was the highest ever recorded for November, and the warm, showery weather caused wheat to make a vigorous growth. There was much complaint of fly in the early sown, and some damage by rust, but the bulk of the crop was reported in excellent condition. Corn gathering was retarded by rains in the northern and western sections, and some corn was damaged. Fall pastures continued in excellent condition.—*A. E. Hackett.*

Montana.—The month opened warm and was mild until the 7th, when the temperature began to fall very rapidly, and the remainder of the month was generally cold. The precipitation was generally in excess of the normal; the heaviest amounts occurred in the northwestern part of State, while the lightest fall was in the southeastern counties. A little plowing was done during the first few days of the month, but after the advent of cold weather, practically nothing in an agricultural line was done.—*Montrose W. Hayes.*

Nebraska.—The unusually large number of cloudy, moist, and rainy days in the southeastern part of the State made the month unfavorable for fall work in that section of the State; corn husking progressed slowly; fall sown grain made rapid and vigorous growth and enters the winter in

excellent condition. In other parts of the State the month was exceptionally fine for pushing fall work, and grain generally made excellent growth.—*G. A. Loveland.*

Nevada.—The month was slightly colder and much wetter than the average November, especially in the eastern, western, central, and southern sections of the State. Storms were somewhat general during the middle portion of the month, being quite severe in the high mountains, where the fall of snow was much heavier than usual for this time of the year. The weather conditions were very favorable to stock interests.—*J. H. Smith.*

New England.—The weather was unusually mild, with mean temperature above the normal at all stations, and in a number of instances broke all previous records of the month. The range of temperature at many points was noticeably small on account of the high minima. There was a marked deficiency in precipitation in all sections. The snowfall was light. Sleet storms were quite general on the 13th and 26th, but no great damage resulted. The weather was very favorable for all outdoor work.—*J. W. Smith.*

New Jersey.—The month was abnormally mild, the mean temperature being the highest recorded in November for the past seventeen years; only on four days did the thermometer fall below the freezing point. The rainfall was below the average in all sections, the least amounts being recorded in the extreme northern portion of the State. Winter grain and grass are in fine condition, fields green, and the stand very good. It was a most favorable month for all farming operations.—*Edward W. McGann.*

New Mexico.—Rather more pleasant than usual. Drought continues in northeastern sections, but there has been little complaint, as flocks and herds have been greatly decreased to meet the scarcity of food and water. Elsewhere stock has wintered well thus far.—*R. M. Hardinge.*

New York.—The temperature was decidedly above, and the precipitation decidedly below, the normal, but the weather was extremely favorable for wheat and rye, which are in excellent condition for wintering. Wheat was sown very late, but it has the usual growth. Much plowing was done, and some apples and potatoes are yet to harvest.—*R. G. Allen.*

North Carolina.—November was the warmest on record in North Carolina. The conditions were highly favorable for all farm work and for the growth of winter crops. A large crop of winter wheat was sown in well prepared soil and grew nicely; at the close of the month fields were green, showing rapid growth, healthy appearance of the plants, and good stands; there was more complaint of damage to early sown wheat by hessian fly than usual in this State. Winter oats and rye were also in excellent condition. The first general killing frost occurred on the 28th; flurries of snow in the west on the 27th.—*C. F. von Herrmann.*

North Dakota.—Warm weather, with but little precipitation, allowed such thrashing as remained unfinished to be done, while stock continued to feed on the ranges during the entire month. There was an almost entire absence of severe weather.—*B. H. Bronson.*

Ohio.—This was the warmest November on record. The precipitation was a little below normal. Wheat made excellent growth; the earliest sown became very large, and fly appeared in a few fields; late sown is in excellent condition. Rye is doing well. Corn was damaged in shock, and fodder injured by wet weather. Pastures are unusually good.—*B. L. Waldron.*

Oklahoma and Indian Territories.—Mild, cloudy weather, with excessive rains, caused wheat to make a rapid growth, becoming too rank the early part of the month, since the ground was too wet to permit pasturing the crop; general prospects were good for the coming year; some evidences of rust and green louse; no damage. The heavy rains delayed cotton picking and did much damage to the remainder of the crop; complaint was made that the bolls opened too slowly or not at all. The corn harvest was ended. Potatoes and turnips made a rapid growth; kaffir corn will make a large second crop. Grass, pastures, and stock are in good condition.—*Chas. A. Hyle.*

Oregon.—Owing to heavy and prolonged rains much of the ground in the western portion of the State has been kept too wet and soft to plow or seed, and the farmers generally are much behind with their fall work; in the eastern sections the weather has been more favorable. Wheat sown during the previous month was slow in germinating and also made a slow growth after it came up. The wheat that is above the ground has a good stand and color and appears vigorous and healthy, notwithstanding its slow growth.—*Edward A. Beals.*

Pennsylvania.—The mean temperature for the month was 11.3° higher than that for the corresponding period in 1901, and the highest since the service was established. The average precipitation was only 60 per cent of what fell during November, 1901, and the least since 1890. The month, as a whole, was favorable for harvesting late crops, corn husking, and the growth of grains and grasses, but in some sections plowing and seeding were retarded by dry soil, and a few early sown wheat fields were turning yellow or affected by fly. Latest reports were to the effect that grains were well rooted, in favorable condition, and making vigorous growth; that pasturage was ample; that plowing was nearing completion, and the corn crop practically all housed.—*H. A. McNally.*

Porto Rico.—This month's weather was highly favorable to all agricultural interests, and young crops look very promising. The new coffee crop has been successfully gathered, the yield being eminently satisfactory. Older canes were permanently injured by the drought of last month, but the young canes made excellent progress, and the preparation of land and the planting for gran cultura is well advanced. New tobacco made flattering progress. Considerable seed will probably yet be sown. Small crops and pastures are in about their normal condition. The shipping of new oranges was actively begun.—*E. C. Thompson.*

South Carolina.—The weather was unusually mild and equable until the 27th and 28th, when a moderate cold wave swept the State, bringing the first snow and sleet of the season, as well as the first killing frost, which occurred on the 28th. Wheat and oats were in fine condition, having come up to good stands. Cotton opened some late bolls, and late crops were gathered in abundance, owing to the prolonged growing season. Truck was exceedingly promising at the close of the month.—*J. W. Bauer.*

South Dakota.—The weather during the month was unusually pleasant and free from storms, periods of cold, or heavy snowfalls, and was highly favorable for the completion of autumn farm work and the uninterrupted grazing of live stock on the ranges. Live stock kept in good condition, but the absence of general snows of any consequence caused free range stock west of the Missouri River to reduce the pasturage near the streams and water holes more than usual.—*S. W. Glenn.*

Tennessee.—The month was remarkably favorable for farm work and the growth of winter grains until the last week, when heavy rains fell, followed by cold weather and light snow on the 27th. Wheat and other grains made rapid growth and were more promising than for years, and in many sections were affording excellent pasturage. Fly appeared in some early sown wheat. Corn and cotton were mostly gathered, but in the western division considerable cotton was still unpicked at the end of the month.—*H. C. Bate.*

Texas.—Killing frosts were reported from the northwestern counties on the 16th and 17th and from the entire State, except the coast district and the southeastern counties, on the 27th; otherwise the temperature during the month was higher than is usual for November. Rains were frequent and in many sections excessive, putting a stop to all farm work and causing flood conditions to prevail in the rivers in the eastern and northern portions of the State. The weather conditions were unusually favorable for the growth of wheat, and in some of the early seeded fields it was from 12 to 18 inches high and liable to suffer serious damage from the first hard freeze; otherwise its condition and that of other cereals were never more promising. Late planted and second growth (top crop) cotton were badly damaged by the prolonged period of wet weather and the subsequent killing frost; bolls have failed to open and are rotting and falling off. Cotton that opened just prior to the rains and was not picked when the rains began was badly stained and much of it beaten to the ground and rendered valueless. The increment to the yield in sight the first of October is very disappointing. Rice in shock suffered considerable damage from wet weather. The bulk of the cane crop was made up during the month, with the yield very satisfactory. Pasturage is excellent and stock in fine condition.—*Edward H. Bowie.*

Utah.—Sugar beet digging was completed during the first decade. The last two decades were too stormy and cold for outdoor farm work. The heavy precipitation placed the ground in good condition and furnished plenty of water for stock. Range feed is very scarce and cattle are already beginning to show the effects of the shortage. Fall grain received a poor start on account of the drought during September and October, and is only in fair condition.—*L. H. Murdoch.*

Virginia.—The month was generally mild and open in character until its close, when there was considerable cloudiness and rains. The growth of crops in all sections of the State was unusually good. Fall sown wheat where put in early attained fine stands, and that late seeded germinated and started off well. In all portions of the State where winter wheat is grown the prospects are very encouraging.—*Edward A. Evans.*

Washington.—The month was wet throughout, especially over the eastern section of the State, where after raining for three weeks the rain turned to snow. October was so unusually dry that only one-third of the fall wheat crop was sown before stopped by rain. Germination was slow, but there is a good stand and it is uninjured.—*G. N. Salisbury.*

West Virginia.—Although dry until the last week, wheat, rye, and oats were in excellent condition at the close of the month, with generally a good stand; reports indicate that fall sown grain has not been in better condition for a number of years, although some complaint is made of injury by the fly; corn is mostly husked and cribbed; pastures very short, but stock in good condition.—*E. C. Vose.*

Wisconsin.—The unusually warm weather during the month, together with the abundant rainfall, was very favorable for the growth of winter grains and grasses; winter wheat and rye made excellent growth, are hardy and well rooted, and in good condition to withstand the winter season; clover is generally reported in satisfactory condition.—*W. M. Wilson.*

Wyoming.—No severe storm visited the State during the month, making the month favorable for the stock interests of the State. Over most of the State the precipitation was below the November normal, and over the Red Desert the lack of snow prevented the flockmasters from moving their sheep to the winter ranges on the desert.—*W. S. Palmer.*

In the following table are given, for the various sections of the Climate and Crop Service of the Weather Bureau, the average temperature and rainfall, the stations reporting the highest and lowest temperatures with dates of occurrence, the stations reporting greatest and least monthly precipitation, and other data, as indicated by the several headings:

Summary of temperature and precipitation by sections, November, 1902.

Section.	Temperature—in degrees Fahrenheit.								Precipitation—in inches and hundredths.					
	Section average.	Departure from the normal.	Monthly extremes.						Section average.	Departure from the normal.	Greatest monthly.		Least monthly.	
			Station.	Highest.	Date.	Station.	Lowest.	Date.			Station.	Amount.	Station.	Amount.
Alabama	58.0	+4.3	5 stations	85	14, 15	Oneonta	21	28	4.22	+0.90	Opelika	6.75	Eufaula	1.95
					17									
Arizona	51.5	−2.5	Aztec	95	5	Flagstaff	−7	24	2.10	+1.18	Flagstaff	6.85	Benson	T.
Arkansas	56.5	+5.3	Helena	90	11	Pond	18	27	6.66	+2.68	Dallas	13.11	Marianna	3.55
California	50.8	−2.4	Ogilby	95	1	Bodie	−10	24, 30	3.61	+1.05	Branscomb	27.29	Mammoth Tank	T.
Colorado	35.9	−0.2	Lamar	82	11	Breckenridge	−20	28	0.70	−0.02	Marshall Pass	3.27	Grover	0.00
Florida	68.4	+3.3	Micanopy	91	6	Wausau	28	28	3.25	+1.24	Carrabelle	7.82	Orleando	0.52
Georgia	59.0	+4.8	Fleming, Millen	88	12	Tallapoosa	21	28	3.69	+0.85	Jesup	6.89	Americus	1.32
Idaho	35.5	−0.4	Boise, Pollock	70	10	Paris	−10	25	2.76	+0.53	St. Maries	7.13	Blackfoot	0.10
Illinois	48.7	+7.9	Cobden	83	10	Lanark	9	30	3.13	+0.43	New Burnside	5.71	Fandon	1.71
Indiana	49.5	+7.8	Richmond	86	2	Northfield	11	28	3.69	+0.10	Paoli	6.59	Auburn	2.07
Iowa	41.2	+8.4	Carroll	79	1	Chester	4	30	2.13	+0.71	Stockport	4.19	Sioux City	0.16
Kansas	46.4	+4.8	Medicine Lodge	85	1	Achilles, Colby	8	29	1.53	+0.64	Independence	6.26	Lebanon, Oberlin	0.00
Kentucky	53.4	+6.7	Pikeville	90	14	Bowling Green	20	28	4.42	+0.37	Alpha	6.77	Lexington	3.09
Louisiana	63.5	+4.8	Plain Dealing	88	8	N. La. Ex. Station	29	28	4.89	+0.81	Lakeside	8.70	Jennerette	2.50
Maryland and Delaware	50.9	+6.7	3 stations	80	13	Sunnyside, Md	11	29	3.11	+0.07	Annapolis, Md	5.40	2 stations	1.84
Michigan	47.2	+7.7	Carsonville	76	11	Ishpeming	4	30	2.64	−0.10	Gaylord	6.00	Roscommon	0.40
Minnesota	33.3	+5.0	St. Peter	68	2	Pokegama Falls	−8	30	1.57	+0.50	Red Wing	4.02	Ada	0.30
Mississippi	66.0	+5.5	Edwards	89	1	Duckhill	24	28	4.61	+1.13	Indianola	8.20	Waynesboro	2.21
Missouri	50.1	+7.3	Halfway	85	11	Maryville, Oregon	18	27	3.54	+1.36	Olden	6.21	Conception	1.51
			Zetonia		13									
Montana	31.0	−0.5	4 stations	62	2, 7, 9	Fort Logan	−10	23	1.26	+0.30	Troy	5.91	Miles City	0.10
Nebraska	38.7	+3.6	Franklin	79	12	Bridgeport	0	29	0.52	−0.15	Odell	3.50	2 stations	0.00
Nevada	37.2	−0.5	Rioville	82	7, 9	Potts	−3	24	1.25	+0.56	Lewers Ranch	3.90	Waubuska	0.15
New England	41.9	+4.8	Westboro, Mass	71	14	Enosburg Falls, Vt	−1	28	1.27	−0.93	Hyannis, Mass	2.71	Fitchburg, Mass	0.45
New Jersey	49.3	+5.8	Bridgeton	80	13	Charlottburg	20	29	2.20	−0.79	Bridgeton	4.17	Sussex	0.87
						Ringwood.								
New Mexico	42.6	+0.6	Carlsbad	93	10	Bluewater	2	26	0.75	+0.05	Taos	2.00	Raton	0.11
						Winsors		30						
New York	43.5	+6.6	Mount Etrick	77	14	Canton, Indian Lake	4	29	1.40	−1.83	Number Four	4.36	Straits Corners	0.50
North Carolina	55.2	+5.4	Pittsboro	88	11	Linville	18	29	3.99	+0.74	Sloan	7.28	Asheville	1.90
North Dakota	27.6	+5.2	3 stations	69	1	Milton	−12	29	0.24	−0.46	Williston	0.72	6 stations	T.
Ohio	48.5	+7.7	New Berlin	87	11	Hillhouse	17	29	2.60	−0.65	Greenville	3.84	Orangeville, Toledo	1.40
Oklahoma and Indian Territories	53.5	+5.3	Claremore, Ind. T	86	11	Kenton, Okla	12	29	5.56	+3.59	Goodwater, Ind. T	12.10	Kenton, Okla	0.29
Oregon	42.6	−0.8	Prineville	76	1	Beulah	9	4	9.11	+3.44	Glenora	31.54	Klamath Falls	0.79
Pennsylvania	47.3	+7.0	Huntingdon	78	1, 2	Lawrenceville	9	30	1.53	−1.96	Aleppo	3.02	Wellsboro	0.50
			Center Hall		13									
			Coatsville.											
Porto Rico	76.6	−0.8	Bayamon	95	10	Caguas	48	16	6.79	−1.73	Hacienda Perla	13.03	Yauco	1.82
			Caguas		16, 22									
South Carolina	59.2	+5.0	Scivern	89	15	Greenville	22	28	3.80	+0.95	Summerville	7.01	Calhoun Falls	1.70
South Dakota	34.2	+3.5	Gettysburg	77	7	Leola	−5	30	0.40	−0.11	Gary	1.05	Ashcroft	T.
Tennessee	54.5	+6.3	McKenzie	84	10	Hohenwald	17	28	4.54	+0.66	Byrdstown	7.60	Bluff City	2.22
			Pope		11									
Texas	61.8	+4.9	Cotulla	95	15	Rhineland	19	27	6.57	+4.30	Beaumont	22.74	Fort Ringgold	0.41
			Fort Ringgold		24									
Utah	36.9	−1.1	Fillmore	81	9	Coyoto	−13	30	1.78	+0.82	Ranch	5.59	Terrace	0.04
Virginia	52.8	+5.1	Lacrosse	88	15	Blacksburg	19	26	3.66	+0.76	Fredericksburg	5.16	Stanardsville	1.10
Washington	40.4	−0.3	Walla Walla	64	2	Wilbur	5	29	6.82	+1.08	Clearwater	20.96	Trinidad	0.35
			Lind		13									
West Virginia	50.3	+7.1	Nuttallburg	83	11	Travellers Repose	12	29	3.27	+0.07	Byrne	4.56	Moscow	1.23
			Romney		12									
Wisconsin	39.6	+7.3	Prairie du Chien	75	13	Haward	2	30	2.40	+0.65	North Crandon	5.75	New Holstien	0.65
Wyoming	32.8	+0.4	Alcova	77	11	South Pass City	−10	26	0.38	−0.22	Fort Yellowstone	2.35	Lusk, Pinebluff	T.

SPECIAL CONTRIBUTIONS.

HAWAIIAN CLIMATOLOGICAL DATA.

By CURTIS J. LYONS, Territorial Meteorologist.

GENERAL SUMMARY FOR NOVEMBER, 1902.

Honolulu.—Temperature mean for the month, 73.3°; normal, 73.8°; average daily maximum, 78.4°; average daily minimum, 68.6°; mean daily range, 9.8°; greatest daily range, 18°; least daily range, 5°; highest temperature, 83°; lowest, 59°.

Barometer average, 29.940; normal, 29.957; highest, 30.08, 11th; lowest, 29.79, 27th; greatest 24-hour change, that is, from any given hour on one day to the same hour on the next, 0.12; lows passed this point on the 2d, 18th, and 27th; highs on the 11th and 23d.

Relative humidity average, 77.8 per cent; normal, 76 per cent; mean dew-point, 65.5°; normal, 65.5°; mean absolute moisture, 6.95 grains per cubic foot; normal, 6.93 grains; dew on 9 mornings.

Rainfall, 9.80 inches; normal, 5.15 inches; rain record days, 23; normal, 17; greatest rainfall in one day, 3.10, on the 2d; total at Luakaha, 26.16 inches; normal, 10.16 inches; total at Kapiolani Park, 5.38 inches; normal, 4.05 inches.

The artesian well level rose during the month from 32.95 to 33.90 feet above mean sea level. November 30, 1901, it stood at 33.56. The average daily mean sea level for the month was 10.13 feet, the assumed annual mean being 10.00 feet above datum. For November, 1901, it was 10.21. Trade wind days, 19 (6 of north-northeast); normal, 17. Average force of wind during daylight, Beaufort scale, 2.2. Average cloudiness, tenths of sky, 5.5; normal, 4.6.

Approximate percentages of district rainfall as compared with normal: South Hilo, 100 per cent; North Hilo, 190 per cent; Hamakua, 165 per cent; Kohala, 160 per cent; Waimea (Hawaii), 180 per cent; Kona, 77 per cent; Kau, 55 per cent; Puna, 120 per cent; Maui, 100 to 200 per cent; Oahu, 160 per cent; Kauai, 175 per cent. The month has been decidedly a very rainy one. The heaviest monthly rainfall was at Punohua, Hilo, 36.10 the heaviest 24-hour, 15.83, same place; at Laupahoehoe, 10.32, 22d.

Mean temperatures: Pepeekeo, Hilo district, 100 feet elevation, mean maximum, 77.3°; mean minimum, 68.7°; Waimea, Hawaii, 2,730 elevation, 79° and 61°; Kohala, 521 elevation, 77.4° and 66.5°; Waiakoa, Kula, Maui, 2,700 elevation, 74.4° and 59.1°; Puunene (mill), mean temperature, 72.2°; Nahiku,

1,600 elevation, 72.5° and 63.5°; Ewa Plantation, 50 elevation, 81° and 67°; United States Magnetic Station, 50 elevation, 81.5° and 61.6°, mean, 74.5°; United States Experiment Station, 350 elevation, 79.6° and 63.8°, mean, 72.5°; W. R. Castle, 60 elevation, highest, 82°; lowest, 59°; mean, 72.7°.

Ewa Mill mean dew-point, 63.8°; mean relative humidity, 72 per cent; Kohala, Dr. B. D. Bond, 65.5° and 78 per cent. Puunene, 65.4° and 78 per cent; Magnetic station, 66.1° and 76 per cent.

The marked features of the month were the rainstorm of the 2d; the easterly storm of the 15th to 18th; and the heavy northerly blow of the 22d. Heavy swell, 6th, 10th, 14th to 20th, and 25th to 30th. Lightning, Hawaii, 29th, 30th. Snow fell on Mauna Loa and Mauna Kea 16th, 29th. Earthquake, Kohala, 9th, 11 a. m. and 10th, 10 p. m., "hard." Hilo, 11th, 6.45 p. m. Kilauea active on the 10th, lava rising 100 feet in the pit of the lake. In the course of ten days action subsided.

Rainfall data for November, 1902.

Stations.	Elevation.	Amount.	Stations.	Elevation.	Amount.
HAWAII.			**OAHU.**		
HILO, e. and ne.	*Feet.*	*Inches.*		*Feet.*	*Inches.*
Waiakea	50	10.36	Punahou (W. B.), sw.	47	9.80
Hilo (town)	100	12.32	Kulaokahua (Castle), sw.	50	7.11
Kaumana	1,250	.....	Makiki Reservoir	120	.....
Pepeekeo	100	18.01	U. S. Naval Station, sw.	6	6.50
Hakalau	200	19.15	Kapiolani Park, sw.	10	5.38
Honohina	300	21.17	Manoa (Woodlawn Dairy), e.	285	15.74
Punohua	1,050	36.10	Manoa (Rhodes Gardens)	300	20.54
Laupahoehoe	500	24.05	School street (Bishop), sw.	175	11.00
Ookala	400	15.61	Insane Asylum, sw.	30	9.43
HAMAKUA, ne.			Kalihi-Uka, sw.	480	21.36
Kukaiau	250	13.45	Nuuanu (W. W. Hall), sw.	50	9.22
Paauilo	750	11.44	Nuuanu (Wyllie street)	250	12.97
Paauhau (Mill)	300	8.79	Nuuanu (Elec. Station), sw.	405	12.40
Honokaa (Muir)	425	8.96	Nuuanu (Luakaha), e.	850	26.16
Honokaa (Meinicke)	1,900	.....	Waimanalo, ne.	25	9.77
Kukuihaele	700	9.15	Maunawili, ne.	300	11.02
KOHALA, n.			Kaneohe	100	7.03
Niulii	200	7.54	Ahuimanu, ne.	350	10.54
Kohala (Mission)	521	7.40	Kahuku, n	25	4.33
Kohala (Sugar Co.)	235	8.17	Waialua	20	5.60
Puakea Ranch	.....	6.29	Wahiawa	900	6.69
Hawi	600	.....	Ewa Plantation, s.	60	4.56
Puuhue Ranch	1,847	10.39	Waipahu	200	3.34
Waimea	2,720	5.56	Moanalua	15	9.76
KONA, w.			Laniakea (Nahuina)	1,150	18.22
Kailua	950	.....	Tantalus Heights	1,360	18.61
Holualoa	1,350	2.40	U. S. Experiment Station	350	9.95
Kealakekua	1,580	3.67	Upper U. S. Exp. Sta. (Castle)	1,150	.....
Napoopoo	25	1.99	U. S. Magnetic Station	45	3.38
KAU, se.			**KAUAI.**		
Kahuku Ranch	1,680	2.80	Lihue (Grove Farm), e.	200	.....
Honuapo	15	3.14	Lihue (Molokoa), e.	300	10.47
Naalehu	650	2.69	Lihue (Kukaua), e.	1,000	11.98
Hilea	310	2.60	Vealia	15	7.33
Pahala	850	4.15	Kealia, e.	15	.....
Moäula	1,700	.....	Kilauea, ne.	325	.....
PUNA, e.			Hanalei, n.	10	14.44
Volcano House	4,090	12.10	Waioli	10	14.37
Olaa, Mountain View (Russel)	1,690	18.56	Haena	15	11.13
Kapoho	110	10.26	Waiawa	32	1.13
Pahoa	700	13.55	Elecle	200	3.03
MAUI.			McBryde (Residence)	850	9.80
Lahaina	40	0.69	Wahiawa	2,100	.....
Waiopae Ranch	700	.....	Lawai	200	6.08
Kaupo (Mokulau), s.	285	11.87	Lawai	450	7.52
Kipahulu, s	300	11.28	Lawai	800	7.30
Nahiku, ne	1,600	33.57	Wahiawa (Mountain)	3,000	26.70
Nahiku	800	21.01			
Haiku, n.	700	10.52	*Delayed October reports.*		
Kula (Erehwon), n.	4,500	4.05	Kaumana	1,250	16.56
Kula (Waiakoa), n.	2,700	3.02	Haena	.....	8.13
Puuomalei, n.	1,400	14.95	McBryde	.....	7.41
Paia	180	5.88	Nahiku	800	19.43
Haleakala Ranch	2,000	.....	Nahiku	1,600	31.14
Wailuku, ne.	200	2.83	Mokulau	.....	6.82

NOTE.—The letters n, s, e, w, and c show the exposure of the station relative to the winds.

OBSERVATIONS AT HONOLULU.

The station is at 21° 18′ N., 157° 50′ W. It is the Hawaiian Weather Bureau station Punahou. (See fig. 2, No. 1, in the MONTHLY WEATHER REVIEW for July, 1902, page 365.)

Hawaiian standard time is $10^h\ 30^m$ slow of Greenwich time. Honolulu local mean time is $10^h\ 31^m$ slow of Greenwich.

The pressure is corrected for temperature and reduced to sea level, and the gravity correction, —0.06, has been applied.

The average direction and force of the wind and the average cloudiness for the whole day are given unless they have varied more than usual, in which case the extremes are given. The scale of wind force is 0 to 12, or Beaufort scale. Two directions of wind, or values of wind force, or amounts of cloudiness, connected by a dash, indicate change from one to the other.

The rainfall for twenty-four hours is measured at 9 a. m. local, or 7.31 p. m., Greenwich time, on the respective dates.

The rain gage, 8 inches in diameter, is 1 foot above ground. Thermometer, 9 feet above ground. Ground is 43 feet and the barometer 50 feet above sea level.

Meteorological Observations at Honolulu, November, 1902.

Date.	Pressure at sea level.	Temperature.		During twenty-four hours preceding 1 p. m. Greenwich time, or 1:30 a. m. Honolulu time.									Total rainfall at 9 a. m., local time.
				Temperature.		Means.		Wind.			Sea-level pressures.		
		Dry bulb.	Wet bulb.	Maximum.	Minimum.	Dew-point.	Relative humidity.	Prevailing direction.	Force.	Average cloudiness.	Maximum.	Minimum.	
	*	†	†			‡	‡		§				
1	29.88	72	71.3	83	65	67.0	82	n-se.	1-0	1-4	30.00	29.87	0.62
2	29.86	72	71.5	77	69	73.3	95	var-w.	1-0	10	29.94	29.86	3.10
3	29.93	68	67.5	79	71	71.7	93	sw.	0	10-8	29.94	29.83	2.50
4	29.96	71	69	80	67	68.5	84	se.	1-0	8-4	29.97	29.88	0.00
5	29.99	76	70	82	70	67.5	76	n-ne.	1-3	4	30.01	29.91	0.02
6	29.98	74	70	81	73	67.5	73	nne.	1-3	3-8	30.01	29.94	0.27
7	29.99	74	69	80	72	67.5	77	nne.	3-1	5-3	30.03	29.94	0.01
8	29.93	73	66	80	71	66.0	72	ne.	3	5	30.04	29.94	0.02
9	29.95	66	63.5	78	73	61 3	64	nne.	3-0	4-0	29.99	29.92	0.00
10	30.00	73	67.5	79	64	64.0	72	ne.	2	3	30.02	29.93	0.00
11	30.03	67	66	80	70	66.3	76	ne.	2-0	4	30.06	29.96	0.01
12	30.01	75	69	81	67	67.0	81	ne.	2-0	1-5	30.08	29.96	0.30
13	29.98	74	68	79	70	65.7	71	ne.	2-4	3	30.04	29.92	0.02
14	29.98	72	69	78	72	65.5	71	ne.	4	5	30.02	29.95	0.17
15	29.93	75	70.5	78	71	66.0	75	ne.	5	6	30.03	29.93	0.20
16	29.94	75	70	79	72	68.0	79	ene.	4-6	8	29.99	29.92	0.60
17	30.00	75	69.5	79	72	67.0	75	ene.	6-4	6	30.01	29.91	0.06
18	29.98	75	68	78	73	66.0	72	ene.	6-4	6	30.02	29.92	0.12
19	29.93	74	70	78	72	65.3	72	ne.	5	6	30.00	29.87	0.20
20	29.94	71	70	78	72	67.0	76	ne.	4-3	4	29.96	29.89	0.01
21	29.94	68	67	80	70	69.5	88	s-n.	1-0	4-7	29.98	29.90	0.36
22	29.99	68	66	81	68	67.0	79	se-ne.	1-0	1-7	30.02	29.90	0.80
23	30.00	69	61	74	68	60.5	72	une.	6-8	9	30.03	29.97	0.15
24	29.95	66	60.5	73	68	53.0	57	une.	4-1	6-10	30.05	29.96	0.00
25	29.86	61	60	74	66	58.5	74	nw.	1-0	10-8	29.96	29.84	0.00
26	29.85	60	59	76	59	62.3	87	nw.	1-0	3	29.90	29.81	0.10
27	29.84	62	61.3	77	59	61.7	85	nnw.	1-0	5	29.90	29.80	0.01
28	29.84	72	66.5	78	60	64.3	88	n.	1-0	4	29.90	29.79	0.00
29	29.83	65	63.7	77	66	64 7	78	nne.	1	6	39.89	29.81	0.15
30	29.89	71	69	78	63	65.3	85	se.	1	3	29.92	29.80	0.00
31	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sums	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....	9.80
Means	29.949	70.5	67.0	78.4	68.6	65.5	77.8	.....	2.2	5.5	29.990	29.894	.....
Departure	—.017	.....	.....	.....	.....	0.0	+1.8	.....	.....	+0.9	.....	.....	+4.65

Mean temperature for November, 1902, $(6+2+9)+3=73.3$; normal is 73.8. Mean pressure for November, 1902, $(9+3)+2=29.940$; normal is 29.957.

* This pressure is as recorded at 1 p. m., Greenwich time. † These temperatures are observed at 6 a. m., local, or 4.31 p. m., Greenwich time. ‡ These values are the means of $(6+9+2+9)+4$. § Beaufort scale.

NOVEMBER GALES FROM THE GREAT LAKES TO THE MARITIME PROVINCES.

By B. C. WEBBER, Meteorological Service, Toronto, Canada, dated December 23, 1902.

In the MONTHLY WEATHER REVIEW for January of the current year a paper was published treating of the gales which have occurred in Canada from the Great Lakes to the Maritime Provinces in January from 1874 to 1902, inclusive. Some interest in this paper having been shown, a similar review for November, 1873 to 1902, has been attempted, hoping that it will prove as instructive to other weather forecasters as it has to the writer.

The number of lows charted, the percentage of storms caused by them, and the percentage of storms caused by lows approaching from the several directions are as follows:

Number of lows and the direction from which they came.

Total number	347	Southwest	83
Northwest	168	Atlantic	31
West	59	Erratic	6

Total percentage of lows causing gales, also percentage of gales due to lows approaching from the several directions.

District.	Total number of gales.	Percentage.	Per cent from—			
			NW.	W.	SW.	Atlantic.
Lakes	188	54.2	49.4	69.5	67.5	0.7
Lower St. Lawrence and Gulf	152	43.8	31.0	45.8	60.2	50.7
Maritime Provinces	142	40.9	25.0	40.7	59.0	70.0

In explanation, it is stated that northwest lows are those originating in or moving from the British Columbia coast east-

ward as far as Manitoba; west lows, those from the Pacific coast States and Western States between latitudes 48° and 35°; southwest lows, from Lower California, Mexico, Texas, and the Gulf of Mexico; Atlantic lows, as designated; erratic lows, developing anywhere from the lakes east to the Maritime Provinces, including the New England States.

The lows comprise all those occurring which were sufficiently well defined to be traced on the charts.

In November the number of storms caused by erratic lows is very few in number, even less than in the January series.

The diminution of storms attributable to northwest lows in their eastward advance is also more marked than in January. The number of storms caused by west lows decreases as they progress eastward even more rapidly than does the number caused by northwest lows. This is somewhat opposed to the January conditions. The percentage of storms caused by southwest lows is considerably larger in November in the Lake region than it is either in the lower St. Lawrence Valley and the Gulf or in the Maritime Provinces. This is contrary to what occurs in January and proves pretty conclusively that the southwest low has a tendency to travel more inland in the autumn months than later in the winter. This is certainly instructive. The general characteristics of the Atlantic lows vary very little from those of January, except that their number appears to be slightly greater, and on rare occasions they spread sufficiently far inland to cause a storm on the lakes.

November is generally asserted to be the stormiest month of the year in the Lake region. It is undoubtedly on the average the stormiest month during the season of navigation; the number of heavy gales that occur is not, however, very large although greater than in December, and, whereas, some Novembers may be excessively stormy, others are comparatively free from storms.

In the lower St. Lawrence Valley and the Gulf, also in the Maritime Provinces, November is not as stormy a month as the three succeeding it.

The gales of November have been divided into three classes, those of a very heavy type, the fresh gales, and the moderate storms. Adding the first two classes together the percentage of the fresh to very heavy gales for the districts is as follows: Lower Lakes, 43.1 per cent; lower St. Lawrence and Gulf, 61.8; Maritime Provinces, 49.3. Consequently fresh to heavy gales are more numerous in the lower St. Lawrence Valley and the Gulf than in the Maritime Provinces and much more so than on the Lakes. In the Lake region the gales of a marked heavy type were 43, this number being considerably greater than in the January series. In the lower St. Lawrence Valley and the Gulf the number was 49 which is 19 less than in January, and in the Maritime Provinces, 34, which number is 20 less than in January. As before mentioned the November series embraces one year more than that for January.

The southwest low is responsible for the greatest number of heavy gales and the northwest low is the next, with about half the number.

Apparently no hard and fast rules can be laid down for the development of any gale from the most severe to the most moderate, but there is unquestionably a tendency for types of conditions to be repeated and for a series of storms either to develop in much the same locality or else to move from much the same quarter, their general conditions and accompaniments being very similar; this at times is particularly marked.

The low area with two foci and the low area with the extensive trough, in which the subsidiary development so often occurs in its southern quadrant, are two classes of depressions responsible for some of the heaviest storms.

RECENT PAPERS BEARING ON METEOROLOGY.

W. F. R. PHILLIPS, in charge of Library, etc.

The subjoined titles have been selected from the contents of the periodicals and serials recently received in the library of the Weather Bureau. The titles selected are of papers or other communications bearing on meteorology or cognate branches of science. This is not a complete index of the meteorological contents of all the journals from which it has been compiled; it shows only the articles that appear to the compiler likely to be of particular interest in connection with the work of the Weather Bureau. Unsigned articles are indicated by a ——.

Scientific American Supplement. New York. Vol. 14.

Dexter, Edwin G. Weather Superstitions. Pp. 22534–22535.

—— Congress for Protection against Hail in Lyons. Pp. 22536–22537.

—— Cobalt Weather Barometer. P. 22538.

Journal of the Manchester Geographical Society. Manchester. Vol. 17.

Greenwood, W. Nelson. The Life of a Wave from its Cradle to its Grave. Pp. 197–222.

Black, J. M. Heat Wave—United States. P. 229.

Science. New York. Vol. 16.

Barus, Carl. Preliminary Results on the Changes of Atmospheric Nucleation. Pp. 948–952.

Symons's Meteorological Magazine. London. Vol. 37.

Schuster, Arthur. Meteorology at the British Association. Address to Sub-section of Astronomy and Cosmical Physics. Pp. 155–159.

Shaw, W[illiam] N[apier]. Radiation in Meteorology. Pp. 159–161.

Ventosa, V. The Moon and Thunderstorms. P. 161.

Nature. London. Vol. 67.

Shaw, W[illiam] N[apier]. The Second Installation of the Ben Nevis Observatory. Pp. 61–62.

M., A. B. Summer and Winter. P. 81.

Solomon, Maurice. The Present State of Wireless Telegraphy. Pp. 131–133.

London, Edinburgh, and Dublin Philosophical Magazine. London. Vol. 4.

Cunningham, J. A. The Discharge of Electricity through Gases and the Temperature of the Electrodes. Pp. 684–704.

Rutherford, E. and Allen, S. J. Excited Radioactivity and Ionization of the Atmosphere. Pp. 704–723.

Journal of Geography. Lancaster. Vol. 1.

Jefferson, M. S. W. The Influence of Ponds and Rivers on Atmospheric Temperatures. P. 400–407.

Astrophysical Journal. Chicago. Vol. 16.

Cortie, A. L. Minimum Sun-Spots and Terrestrial Magnetism. Pp. 203–211.

Ciel et Terre. Bruxelles. 23me Année.

Lancaster, A. Étude pluviométrique sur le Bassin de la Meuse. [Note on article by D. Vanhove.] P. 457–460.

L., V. D. L'état actuel de la question du tir contre la grêle. Pp. 460–461.

—— De l'origine des "Mistpoeffers." [Note on work by M. Oldham.] Pp. 461–462.

—— L'ozote des eaux de pluie et des eaux de drainage. P. 462.

L., V. D. Une ascension aérostatique célèbre. Pp. 465–472.

—— Échanges de chaleur entre le sol, l'eau et l'atmosphère. [Note on article by Schubert.] P. 488.

Annuaire de la Société Météorologique de France. Paris. 50me Année.

Angot, Alfred. Rapport sur la Conférence Internationale tenue à Graz (Styrie) du 20 au 25 juillet 1902, pour l'étude des tirs contre la grêle. Pp. 193–197.

Moureaux, Th. Pertubation atmosphérique du 13 juillet 1902. Pp. 195–199.

Comptes Rendus de l'Académie des Sciences. Paris. Tome 135.

Guillaume, J. Observations du soleil, faites à l'Observatoire de Lyon pendant le troisième trimestre de 1902. Pp. 887–889.

Archives des Sciences Physiques et Naturelles. Genève. 4me période. Tome 14.

Gautier, R. Observations météorologiques faites aux fortifications de Saint-Maurice pendant les mois de décembre 1901, janvier, février et mars 1902. Pp. 303–311.

Gautier, R. Observations météorologiques faites aux fortifications de Saint-Maurice pendant les mois d'avril, mai, juin et juillet 1902. Pp. 442–449.

Gautier, R. Résumé météorologique de l'année 1901 pour Genève et le Grand Saint-Bernard. Pp. 564–589.

Annales Agronomiques. Paris. Tome 28.

Giustiniani, E. Sur la végétation de certaines plantes à la lumière solaire directe et à l'obscurité. [Note on article by N. Passerini.] Pp. 576–577.

Annalen der Hydrographie und Maritimen Meteorologie. Hamburg. 30 Jahrgang.

Hoeck, —. Barometrische Depressionen an der äquatorialen Grenze des Golfstromes im Februar 1902. Pp. 559–563.

Das Wetter. Berlin. 19 Jahrgang.

Sprung, A. Einige Gedanken zum Rüstzeug eines Meteorologischen Observatoriums. Pp. 241–246.

Rotch, A. Lawrence. Die Cirkulation der Atmosphäre in den Tropen und am Aequator. Pp. 251–257.
Rimpau, W. Die Wirkung des Wetters auf die Zuckerrüben-Ernten der Jahre 1891 bis 1900. Pp. 258–260.
—— Drachenversuche an Bord von Dampfern. Pp. 262–263.

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Thiel, A. and Abegg, F. Ueber Tropfenbildung bei Rauch. Pp. 129–132.

Meteorologische Zeitschrift. Wien. Band 19.

Ekholm, Nils. Ueber Emission und Absorption der Wärme und deren Bedeutung für die Temperatur der Erdoberfläche. P. 489–505.
—— Hervé Faye. P. 505–506.
—— Robert Rubenson. P. 506.
Maurer, J. Professor Dr. Heinrich v. Wild. P. 506.
Fényi, J. Ueber Luftspiegelungen in Ungarn. Pp. 507–509.
Hann, J. Klima am oberen Schari im französischen Sudan. Pp. 509–512.
—— Ergebnisse der meteorologischen Beobachtungen zu Guatemala im Jahre 1901. Pp. 512–513.
—— Zum Klima von Martinique. Pp. 513.
—— Magnetische Elemente am Observatorium in Valentia. Pp. 513–514.
Hann, J. Maxwell Hall über die Temperatur von Kingston Jamaika und deren Beziehungen zur Sonnenfleckenperiode. Pp. 514–515.
Hergesell, —. Vorläufiger Bericht über die internationale Ballonfahrt vom 3. April 1902. Pp. 515–516.
Hergesell, —. Vorläufiger Bericht über die internationale Ballonfahrt vom 1. Mai 1902. Pp. 516–517.
Hergesell, —. Vorläufiger Bericht über die internationale Ballonfahrt vom 5. Juni 1902. Pp. 517–518.
Hergesell, —. Vorläufiger Bericht ueber die internationale Ballon fahrt vom 3. Juli 1902. Pp. 518–519.
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Hergesell, —. Vorläufiger Bericht über die internationale Ballonfahrt vom 4. September 1902. Pp. 519–520.
Taudin Chabott, J. J. Der sogenannte Sonnenuntergang und das optische Verhalten der Atmosphäre nach den jüngsten Aeusserungen vulkanischer Thätigkeit in Mittelamerika (mit Tafel). Pp. 520–521.
Danckelman, v. Ergebnisse der meteorologischen Beobachtungen in Deutsch-Südwestafrika 1900–1901. Pp. 521–523.
Polis, P. Das Gewitter zu Aachen am 30 Juni 1902. Pp. 523–525.
Laska, W. Das Wetter und die Telegraphendrähte. Pp. 525–526.
Bergholz, P. Klima von Bremen. Pp. 526–527.
—— Meteorologische Beobachtungen auf Belle Isle 1900–1901. Pp. 527–528.
Boccara, E. Ueber die tägliche Variation der atmosphärischen Refraktion. P. 528.
Birkeland, Kr. Resultate der magnetischen Untersuchungen der norwegischen Expedition zum Studium der Polarlichter 1899–1900. Pp. 528–530.
Reimann, —. Zur Höhe der Gewitterwolken. Pp. 530–531.
Grundmann, G. Der Schreiber'sche Nadelkohärer. P. 531.
—— Harmattan auf der See beobachtet. P. 532.
—— Meteorologie von Nieder-Kalifornien. P. 532.
—— Thermische Wirkung der Doppelfenster. P. 532.

CLIMATOLOGICAL DATA FOR JAMAICA.

Through the kindness of H. H. Cousins, chemist to the Government of Jamaica and now in charge of the meteorological service of that island, we have received the following table in advance of the regular monthly weather report for Jamaica:

Comparative table of rainfall for November, 1902.

Divisions.	Relative area.	Number of stations.	Rainfall.	
			Average.	1902.
	Per cent.		*Inches.*	*Inches.*
Northeastern division	25	21	10.97	9.47
Northern division	22	47	5.85	2.55
West-central division	26	21	6.06	6.42
Southern division	27	32	4.78	3.97
	100	121	6.91	5.60

The rainfall was, therefore, below the average for the whole island. The highest fall recorded was 31.27 inches, at Moore Town, in the northeastern division, while 0.30 inch fell at Round Hill, in the northern division.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physical Geographic Institute.

[For tables see the last page of this REVIEW preceding the charts.]

Notes on the weather.—On the Pacific slope rain was rather scarce, although pretty continuous during the first half of the month. In San Jose the pressure was slightly under the normal; temperature higher; rainfall in deficit for about one-third of the average, with an excess of five days. On the Atlantic coast the rainfall was excessive, while it was deficient, although not scarce, at the stations of the interior at the foot of the Cordillera.

Notes on earthquakes.—November 16, slight shock at $6^h\ 2^m$ a. m., direction ENE–WSW, intensity II, duration 3 seconds. November 26, trepidatory movement at $1^h\ 40^m$ p. m., intensity III, duration 12 seconds. November 28, $9^h\ 45^m$ p. m., slight shock, N–S, intensity IV, duration 7 seconds. (The same day a slight shock was felt at Cachi at $9^h\ 45^m$ p. m., same direction).

ANNUAL WIND RESULTANTS.

By T. H. DAVIS, New Haven, Conn., dated February 20, 1902.

I do not believe that mathematical methods, inductive or deductive, will ever bring us to any clear conclusion as to the general circulation of the atmosphere, neither will it do to assume general physical laws as sufficient. The oscillatory movements and the progressive changes of winds can, I firmly believe, only be solved by careful, faithful observations and patient perseverance, and I respectfully submit the following contribution to the numerical method of treatment.

As a basis for a systematic investigation of annual frequencies of wind direction, I have used the directions recorded hourly, as given in full in the successive Annual Reports of the meteorological services of the United States and Canada, for the ten years 1891–1900; twenty-eight stations belong to the United States and six to Canada. From these I have computed the resultant directions, thereby obtaining figures that are as free as possible from the effect of the diurnal variation of the wind. The general method of computation is shown in the example copied in Table 1.

TABLE 1.—*Computation of annual resultant directions from hourly records of winds.*

BISMARCK, N. DAK.

Observed.		N.	E.	S.	W.
Direction.	Number.				
N	852	852	.....	.....	.....
NE	677	479	479	.....	.....
E	1,266	.....	1,266	.....	.....
SE	1,060	.....	749	749	.....
S	530	.....	.....	530	.....
SW	377	.....	.....	267	267
W	768	.....	.....	.....	768
NW	3,033	2,149	.....	.....	2,144
Totals	8,563*	3,475	2,494	1,546	3,179
	.....	1,546	.....	.....	2,494
Surplus	.....	1,929	.....	.....	685
	Resultant.....N. 21° W.				

* The difference between this number and the 8,760 hourly observations is due to calms and missing records.

All the resultants thus computed for each of the years 1891–1900 are given in Table 2. It will be noticed that instead of reckoning directions uniformly from the north point eastward around the circle I have started from either one of the four cardinal points, north, south, east, or west, as seemed most appropriate in each case. In general it will be seen that westerly winds have prevailed during this decade at all stations, except those in the region extending from Salt Lake City and Kansas

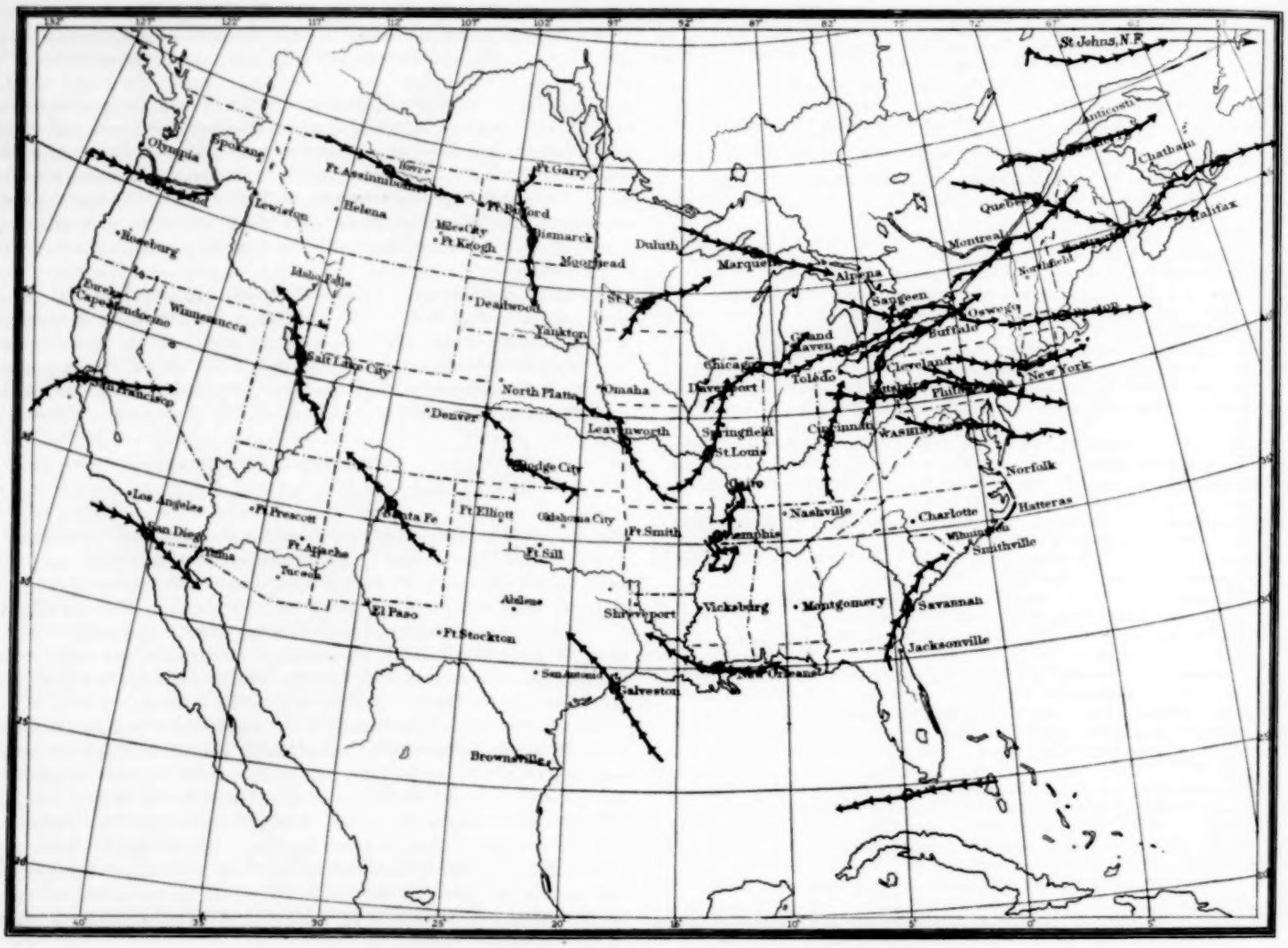

FIG. 1.—Davis's annual resultants of hourly wind directions.

City southeastward to New Orleans and Key West; in this region easterly and southerly resultants have prevailed.

It would also seem that these annual resultants must indicate some fundamental facts in atmospheric phenomena, and in order to critically study them I have plotted upon squared paper the angular directions considered as deviations from the adopted cardinal points, so that one perceives graphically the succession of changes from year to year. I regret that these diagrams are considered too voluminous to publish, but of course almost the same results can be obtained by a careful study of the numbers themselves, as given in Table 2. The changes of the resultants from year to year are sometimes progressive, but more often they suggest secular periodical changes in the circulation of the atmosphere. I have plotted all these resultants also on a chart of North America. (See fig. 1.) This chart shows ten short arrows at each station, following each other in regular succession and representing the individual resultants from 1891 to 1900. The central dot for any station is near the middle of its series of annual resultants. By studying these thirty-four separate series, we quickly see the geographical limits of the above-mentioned regions of easterly, southerly, and westerly resultants. By considering an imaginary straight line, representing the average resultant for each station, we perceive certain chronological laws, viz, that the individual years differ systematically first to the right and then to the left of this average value; these systematic deviations are closely analogous for stations that are near together, but have no apparent analogy when they are far apart. Possibly longer series of years will enable us to trace some important chronological law in the general circulation of the atmosphere, as shown by such annual resultants. Suggestions have been made as to the apparent influence of sun-spot periods, but I see no substantial evidence of this, and in fact the resultants for twenty or thirty years, or three sun-spot periods, would be needed in order to fully establish any such connection.

The extreme oscillations of the annual resultants from year to year during the decade in question are shown in Table 3 for each of the stations, and the general character of each oscillation and of the progressive motion is also stated therein.

In the preceding work I have employed complete sets of twenty-four observations daily, thereby eliminating any possible effect of the diurnal variation of the wind and securing perfect comparability in this respect for all the stations. But in order to study the possibility of a secular periodicity in the annual resultants, I have selected Key West as a station that is probably subject to less irregular variation than any other on the list in Table 2, and have computed for it the annual resultant for each year from 1873 to 1900. The results are given in Table 4, as also in fig. 2. Owing to changes in the hours of observation, these resultants may not be strictly comparable; in fact, the whole series is broken up into the following sections: 1873–1886, observations at 7 a. m., 2 p. m., and 9 p. m., Key West meridian time; 1887–88, observations at 7 a. m., 3 p. m., 10 p. m., seventy-fifth meridian time; 1889–90, observations at 8 a. m. and 8 p. m., seventy-fifth meridian time; 1891–1900, from anemograph records hourly, on seventy-fifth

TABLE 2.—*Resultant directions of wind.*

Station.	1891.	1892.	1893.	1894.	1895.	1896.	1897.	1898.	1899.	1900.
	°	°	°	°	°	°	°	°	°	°
Bismarck, N. Dak	n. 11 e.	n. 41 e.	n. 20 w.	n. 17 w.	n. 37 w.	n.	n. 4 e.	n. 19 w.	n. 20 w.	n. 8 e.
Boston, Mass	w. 11 n.	w. 2 n.	w. 1 n.	w.	w. 6 n.	w. 13 n.	w. 8 n.	w. 8 n.	w. 1 n.	w. 7 n.
Buffalo, N. Y	w. 40 s.	w. 10 s.	w. 21 s.	w. 9 s.	w. 8 s.	w. 15 s.	w. 23 s.	w. 29 s.	w. 19 s.	w. 25 s.
Chicago, Ill	w. 64 s.	w. 17 s.	w. 45 s.	w. 43 s.	w. 27 s.	w. 23 s.	w. 5 n.	w. 45 s.	w. 56 s.	w. 42 s.
Cincinnati, Ohio	s. 22 e.	s. 9 w.	s. 7 e.	s. 16 w.	s. 21 w.	s.	s. 34 w.	s. 22 w.	s. 4 w.	s. 27 w.
Cleveland, Ohio	s. 30 w.	s. 45 w.	s. 23 w.	s. 12 w.	s. 9 w.	s. 27 w.	s. 36 w.	s. 10 w.	s. 14 w.	s. 20 w.
Detroit, Mich	w. 3 s.	w. 17 s.	w. 29 s.	w. 17 s.	w. 3 s.	w. 14 s.	w. 13 s.	w. 30 s.	w. 12 s.	w. 20 s.
Dodge, Kans	s. 35 w.	e. 7 s.	e. 13 s.	e. 30 s.	e. 14 s.	e. 24 s.	s. 5 w.	e. 83 s.	e. 29 s.	e. 37 s.
Eastport, Me	w. 3 n.	w. 7 n.	w. 7 n.	w. 6 s.	w. 20 s.	w. 6 n.	w. 3 n.	w. 3 s.	w. 10 n.	w. 10 n.
Galveston, Tex	e. 46 s.	e. 56 s.	e. 57 s.	e. 56 s.	e. 57 s.	e. 61 s.	e. 48 s.	e. 44 s.	e. 40 s.	e. 37 s.
Havre, Mont	*	w. 1 s.	w. 22 n.	w. 4 n.	w. 18 n.	w. 21 n.	w. 16 n.	w.	w. 2 n.	w. 10 n.
Kansas City, Mo	e. 19 s.	e. 46 s.	e. 44 s.	e. 63 s.	e. 62 s.	e. 63 s.	e. 86 s.	e.	e. 18 s.	e. 53 s.
Key West, Fla	e. 8 n.	e. 3 s.	e. 3 n.	e. 4 n.	e. 11 n.	e. 9 n.	e. 5 n.	e.	e. 12 n.	e. 8 n.
Marquette, Mich	w. 19 n.	w. 37 n.	w. 14 n.	w. 20 n.	w. 18 n.	w. 15 n.	w. 27 n.	w. 14 n.	w. 17 n.	w. 16 n.
Memphis, Tenn	w. 49 n.	e. 61 n.	w. 6 s.	w. 72 s.	e. 16 n.	e. 50 s.	w. 7 s.	w. 86 s.	w. 45 s.	e. 74 s.
New Orleans, La	e. 28 s.	e. 27 n.	e. 4 n.	e. 5 s.	e. 12 s.	e. 12 s.	e. 22 s.	e. 28 s.	e. 53 s.	e. 17 s.
New York, N. Y	w. 20 s.	w. 12 s.	w. 7 s.	w. 13 s.	w. 12 n.	w. 12 n.	w. 4 s.	w. 22 n.	w. 28 n.	w. 9 n.
Philadelphia, Pa	w. 23 n.	w. 30 n.	w. 39 n.	w. 14 n.	w. 28 n.	w. 24 n.	w. 25 n.	w. 20 n.	w. 22 n.	w. 21 n.
Pittsburg, Pa	w. 8 n.	w. 18 n.	w. 15 n.	w. 4 s.	w. 7 n.	w. 21 s.	w. 25 s.	w.	w. 29 n.	w. 29 n.
Portland, Oreg	w. 88 s.	w. 14 n.	w. 9 n.	w. 3 n.	w. 5 s.	w. 4 n.	w. 11 n.	w. 2 s.	w. 44 s.	w. 28 s.
St. Louis, Mo	w. 9 s.	w. 38 s.	w. 49 s.	w. 60 s.	w. 57 s.	w. 73 s.	w. 83 s.	w. 70 s.	w. 82 s.	w. 76 s.
St. Paul, Minn	†	†	w. 50 s.	w. 72 s.	w. 46 s.	w. 41 s.	w. 18 s.	w. 2 s.	w. 25 s.	w. 39 s.
Salt Lake City, Utah	s. 40 e.	s. 33 e.	s. 72 e.	s. 11 e.	s. 7 e.	s. 26 e.	s. 26 e.	s. 4 e.	s. 43 e.	s. 54 e.
San Diego, Cal	w. 10 n.	w. 6 n.	w. 9 n.	w. 17 n.	w. 25 n.	w. 32 n.	w. 33 n.	w. 28 n.	w. 30 n.	w. 28 n.
San Francisco, Cal	w. 22 s.	w. 22 s.	w. 46 s.	w. 47 s.	w. 11 s.	w. 8 s.	w. 2 s.	w. 14 s.	w. 17 s.	w. 11 s.
Santa Fe, N. Mex	e. 39 s.	e. 19 s.	e. 45 s.	e. 53 s.	e. 50 s.	e. 45 s.	e. 35 s.	e. 39 s.	e. 55 s.	e. 31 s.
Savannah, Ga	s. 8 e.	s. 21 w.	s. 21 w.	s. 29 w.	s. 43 w.	s. 6 w.	s. 51 w.	s. 20 w.	s. 50 w.	s. 68 w.
Washington, D. C	w. 31 n.	w. 23 n.	w. 25 n.	w. 11 s.	w. 20 n.	w. 11 n.	w. 45 n.	w. 11 n.	w. 10 s.	w. 16 n.
Montreal, Que	w. 40 s.	w. 6 n.	w. 26 s.	w. 35 s.	w. 36 s.	w. 4 n.	w. 28 s.	w. 34 s.	w. 34 s.	w. 34 s.
Quebec, Que	w. 23 n.	w. 24 n.	w. 27 n.	w. 41 n.	w. 7 n.	w. 46 n.	w. 23 n.	w. 44 n.	w. 26 n.	w. 12 n.
Father Point, Que	w. 6 s.	w. 23 n.	w. 10 n.	w. 4 n.	w. 8 s.	w. 3 n.	w. 9 n.	w.	w. 4 s.	w. 15 s.
St. Johns, N. F	w. 53 s.	w. 63 n.	w. 30 n.	w. 30 n.	w.	w. 34 n.	w. 3 n.	w. 4 s.	w. 4 n.	w.
Toronto, Ont	w. 22 n.	w. 37 n.	w. 25 n.	w. 10 n.	w. 21 s.	w. 4 n.	w. 19 n.	w. 54 n.	w. 21 n.	w. 2 n.
Sydney, N. S	w. 33 s.	w. 39 s.	w. 23 s.	w. 8 n.	w. 17 s.	w. 3 n.	w. 1 s.	w. 2 s.	w. 3 n.	w. 6 n.

*Report incomplete. †Doubtful.

meridian time. In order to get some idea of the effect of using twenty-four hourly observations instead of two or three, I have for the years 1895–1899 computed the resultants for two observations per day, 8 a. m. and 8 p. m., standard time, with the following results: 1895, E. 15° N; 1896, E. 12° N.; 1897, E. 6° N.; 1898, E. 4° N.; 1899, E. 16° N. By comparing these with the resultants given in Table 4, it appears therefore that the resultant of 8 a. m. and 8 p. m. is almost uniformly 4° farther north than the resultant of twenty-four hourly observations. This small constant difference will not affect the general result deducible from Table 4 and fig. 2, viz, that the annual resultant winds at Key West fluctuate in a systematic manner, having been farthest north of east at about 1873.0, 1877.5, 1886.0, 1895.0, and 1899.5. The average of these extreme northerly resultants is about E. 14° N. The annual resultants have been farthest south about 1875.5, 1880.0, 1892.0, and 1898.0. The average of these extreme southerly annual resultants is about 1° south of east.

The maxima and minima of Wolfer's sun-spot numbers are published in the MONTHLY WEATHER REVIEW for April, 1902, and we quote the dates from page 176, as follows:

Minimum, 1867.2; maximum, 1870.6; minimum, 1878.9; maximum, 1883.9; minimum, 1889.6; maximum, 1894.1; minimum, 1901.5. There is no apparent causal connection between these dates and those of the extreme deviations of the resultant winds at Key West.

In order to extend the investigation to another supposedly quiet region, I have also computed the resultants of all winds observed in the Bermudas during the years 1889–1900. The resultants are shown in fig. 3, from which it will be seen that the range of direction has been unexpectedly great, viz, from west 75° south, in 1895, to west 1° south, in 1898. Here again I could use but a few observations daily instead of hourly records, but I see no reason to doubt the general accuracy of the result, and this great range occurs without special connection with either a maximum or minimum of sun spots.

In order to compare the wind resultants at low stations with those that obtain at the highest stations, I have computed the resultants for Mount Washington, 1877–1886, and Pikes Peak, 1876–1887. The results are shown on fig. 4. Of course, these computations have been based entirely upon tridaily observations; but this can not alter the general conclusion that when

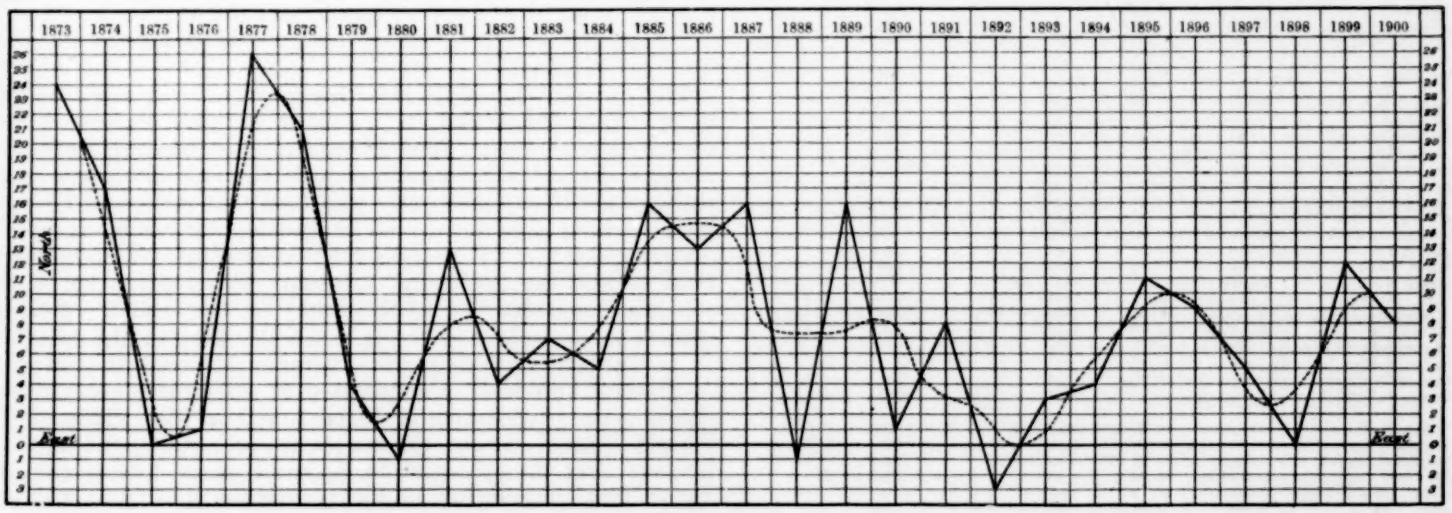

FIG. 2.—Davis's resultants of all observations of winds at Key West, Fla.

the resultants are most northerly at one station they are most southerly at the other and vice versa.

The remarkable relations revealed by these tables and charts show that the natural relations of the winds are complex and still obscure. I see no indication of a sun spot nor of a lunar influence. To what natural laws or combinations of laws are we to attribute these variations in the annual resultants?

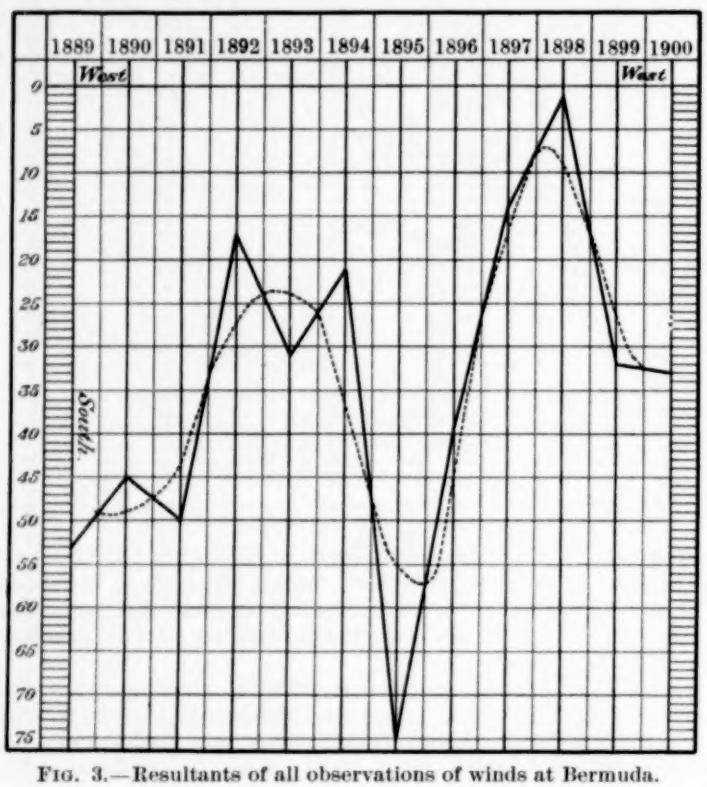

FIG. 3.—Resultants of all observations of winds at Bermuda.

TABLE 3.—*Ranges of annual resultants in the United States and Canada.*

Station.	Annual oscillation, mean curve.	Variation of resultant from east or west.					Tendency of progression north or south. (See charts.)
		Maximum degree and direction.	Year.	Minimum degree and direction.	Year.	Range.	
		°		°		°	
Bismarck, N. Dak	Regular	e. 41 n.	1892	w. 53 n.	1895	78	n.
Boston, Mass	do	w. 13 n.	1896	w.	1894	13	n.
Buffalo, N. Y	Irregular	w. 40 s.	1891	w. 8 s.	1895	32	n.
Chicago, Ill	do	w. 64 s.	1891	w. 5 n.	1897	69	s.
Cleveland, Ohio	Regular	w. 81 s.	1895	w. 45 s.	1892	36	s.
Cincinnati, Ohio	do	e. 68 s.	1891	w. 63 s.	1897	49	n.
Detroit, Mich	do	w. 30 s.	1898	w. 3 s.	1891, 1895	27	s.
Dodge, Kans	Irregular	w. 85 s.	1897	e. 7 s.	1892	88	s.
Eastport, Me	do	w. 20 s.	1895	w. 3 s.	1898	30	n.
Galveston, Tex	Regular	e. 61 s.	1896	e. 37 s.	1900	24	n.
Havre, Mont	Irregular	w. 22 n.	1893	w.	1898	23	s.
Kansas City, Mo	do	e. 86 s.	1897	e.	1898	86	n.
Key West, Fla	do	e. 26 n.	1877	e.	1875, 1898	29	
Marquette, Mich	do	w. 37 n.	1892	w. 14 n.	1893, 1898	23	s.
Memphis, Tenn	do						
New Orleans, La	do	e. 53 s.	1899	e. 5 s.	1894	80	s.
New York, N. Y	Regular	w. 28 n.	1899	w. 4 s.	1897	48	n.
Philadelphia, Pa	Irregular	w. 39 n.	1893	w. 14 n.	1894	25	s.
Pittsburg, Pa	do	w. 30 n.	1899	w. 4 s.	1894	55	n.
Portland, Oreg	do	w. 44 s.	1899	w. 5 s.	1895	58	s.
St. Louis, Mo	Regular	w. 83 s.	1897	w. 9 s.	1891	74	s.
St. Paul, Minn	do	w. 72 s.	1894	w. 2 s.	1898	70	n.
Salt Lake City, Utah	Irregular	e. 86 s.	1898	e. 18 s.	1893	68	s.
San Diego, Cal	Regular	w. 33 n.	1897	w. 6 n.	1892	27	n.
San Francisco, Cal	do	w. 47 s.	1894	w. 2 s.	1897	45	n.
Santa Fe, N. Mex	do	e. 55 s.	1899	e. 19 s.	1892	36	s.
Savannah, Ga	Irregular	w. 84 s.	1896	w. 22 s.	1900	62	n.
Washington, D. C	Regular	w. 45 n.	1897	w. 10 s.	1899	56	s.
St. Johns, N. F	Irregular	w. 63 n.	1892	w.	1900	67	s.
Sydney, C. B. I	do	w. 39 s.	1892	w. 2 s.	1898	47	n.
Father Point, Que	Regular	w. 23 n.	1892	w.	1898	78	s.
Quebec, Que	Irregular	w. 46 n.	1896	w. 7 n.	1895	39	
Montreal, Que	Regular	w. 40 s.	1891	w. 4 n.	1896	46	s.
Toronto, Ont.	do	w. 54 n.	1898	w. 4 n.	1896	75	n.

The locations of the general areas of high and low pressure or the general trend of isobars at any time has a definite influence on the winds of that date; so, also, these resultants have some relation to the annual or normal isobars; but the outstanding discrepancies are still very great. The primary consideration in explaining these must be the permanent location and influence of the continents and oceans and the temporary influence of the areas of high and low pressure that move about just enough to justify their being known as subpermanent tropical areas. The effect of the diurnal land and sea breezes and the annual monsoon winds seems to be inappreciable.

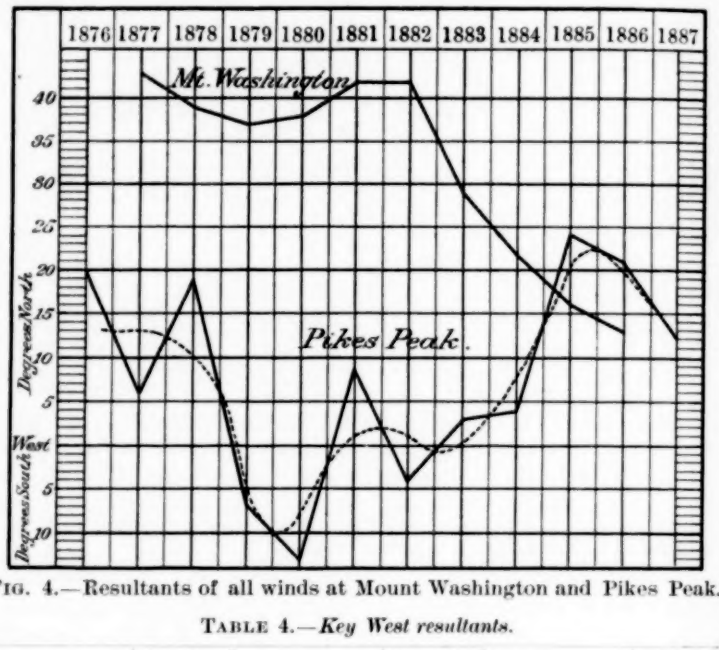

FIG. 4.—Resultants of all winds at Mount Washington and Pikes Peak.

TABLE 4.—*Key West resultants.*

Year.	Direction from—	Year.	Direction from—	Year.	Direction from—
	°		°		°
1873	e. 24 n.	1883	e. 7 n.	1892	e. 3 s.*
1874	e. 17 n.	1884	e. 5 n.	1893	e. 7 n.*
1875	east.	1885	e. 16 n.	1894	e. 4 n.*
1876	e. 1 n.	1886	e. 13 n.	1895	e. 11 n.*
1877	e. 26 n.	1887	e. 16 n.	1896	e. 9 n.*
1878	e. 21 n.	1888	e. 1 s.	1897	e. 5 n.*
1879	e. 4 n.	1889	e. 16 n.	1898	east.*
1880	e. 1 s	1890	e. 1 n.	1899	e. 12 n.*
1881	e. 13 n.	1891	*e. 8 n.	1900	e. 8 n.*
1882	e. 4 n.				

*The resultants for 1891–1900 are those deduced from the hourly observations.

THE CLIMATOLOGY AND WATER POWER OF PORTO RICO.

By WM. H. ALEXANDER, Observer, Weather Bureau, dated December 29, 1902.

The climatology of Porto Rico is, in several respects, unknown and the island is therefore to some extent a new meteorological field. It is certainly a most inviting one to the student of tropical meteorology, as it presents in a small space many of the most interesting problems. It possesses a singularly peculiar topography which creates surprising local climatic differences. Analogous differences moreover characterize more or less the geological structure, the composition of the soil, the flora, and the hydrography of the island. For instance, the island, small as it is, has a range in the extremes of precipitation (that is, the difference between the amounts of greatest and least precipitation at different places) almost if not quite as great as is to be found in the whole of the United States. These differences are so pronounced and important that they can not be ignored when considering the agricultural possibilities and water resources of the island and must be taken into account in all problems relative to irriga-

tion and the construction of highways. Each locality has its own peculiarities and possibilities and must be studied independently in order to arrive at a safe working knowledge upon which to launch a new enterprise. General statements as to climate, soil, flora, and hydrographic conditions are often misleading and wholly inadequate for either business or scientific purposes, and the sooner exact data are available the sooner may we expect to see the development of the island go forward by the successful establishment of new enterprises.

In recognition of these peculiar conditions and in the hope of securing for and presenting to the public fuller and more exact information relative thereto, the Chief of the Weather Bureau has just authorized some special work in the collection of all information possible, both new and old, bearing on the climatology of the island and its relation to crops, hygiene, water power, commerce, and other matters of public interest. Introductory to this work, the results of which will be published later, and more especially to that part relative to the water resources of the island, it may be well to make a few observations in regard to its topography and rainfall.

In form, the island of Porto Rico is strikingly rectangular, the greater axis lying almost exactly east and west. The average width of the island is about 35 miles, and the average length about 105 miles. The area is, therefore, about 3,670 square miles. This, of course, is exclusive of the smaller dependent islands such as Vieques, Culebra, and others. The orography of the island constitutes its most striking and important characteristic. The mountains are not very high, but almost the entire surface of the island is covered with mountain peaks of varying heights and shapes, apparently without order or system as to arrangement. In places these mountains meet the sea with such abruptness that there is not room for even a driveway between mountain and sea, and in no place is there a marginal coast of considerable breadth. Notwithstanding this apparently confused and indiscriminate arrangement of the mountains, there is indeed a well-defined watershed dividing the island into two unequal portions. This divide extends from the southwest corner of the island eastward, closely parallel to the southern coast line and from 10 to 15 miles from it until within the vicinity of Guayama it approaches even nearer to the coast and then trends northeastward as does the coast line finally culminating in the highest peak on the island, El Yunque. This dividing ridge varies in height from 2,500 to 3,670 feet, and is made up of several sections, each having its own name. It will thus be evident that about one-third of the island is situated to the south of this divide and two-thirds to the north. The southern slope is necessarily very abrupt while the northern is more gradual. Both are broken up into innumerable hills and mountains with as many streams between, giving to the island a truly rugged aspect. It may help to a proper appreciation of the mountainous nature of the interior to know that there are in Porto Rico between 1,200 and 1,300 streams having names and of these about 30 are true rivers, many of them having magnificent waterfalls, especially those on the northern slope. Thus the island is divided hydrographically into two distinct sections: one lying to the east and south of the watershed, where the rivers are short and the velocity of their waters very great. The rivers of this section vary in length from 5 to 15 miles measured along their stream beds. The other section lies to the north and west of the divide and has longer rivers with larger basins. Here the rivers vary in length from 35 to 40 miles. These rivers are often very precipitous in their descent, especially for the first few miles below their sources where they frequently descend from 1,000 to 2,000 feet within less than 10 miles. Naturally, therefore, one would expect to find not a few magnificent waterfalls of great power and beauty. The possibilities of these falls as sources of power and for other purposes certainly merit a more thorough investigation than has heretofore been accorded them.

Porto Rico lies well within the northeast trade winds, which blow with great constancy throughout the year, and owing to the peculiar relation of the topography of the island to these winds, we find that the hydrographic divisions answer also for climatological purposes, the essential and determining causes being practically the same. Given, therefore, a thorough knowledge of the topography, one is at once in possession of a key to the peculiar distribution of the rainfall over the island. Under existing conditions, the east and north sides of the divide must receive by far the greater rainfall and the south and west sides the less. The records abundantly confirm the correctness of this statement. The heaviest rainfall in Porto Rico occurs in the neighborhood of Luquillo in the northeastern part of the island. There the annual fall amounts to about 150 inches. A fall of 100 inches or more at stations situated on or near the watershed is of common occurrence. Along the northern slope and especially near the coast the fall is much less, the average for a north coast station being about 55 inches. That portion of the island south and west of the divide receives still less rainfall. Not only so, but the fall seems to be more or less erratic, often resulting in severe droughts and rendering irrigation indispensable. It is thus seen that Porto Rico has wet and dry sides, more pronounced than its so-called "wet and dry seasons." The effect of this difference in the rainfall is at once seen by contrasting the truly tropical luxuriance of the vegetation on the north side with the barren hills and semiarid slopes on the south side. The dry stony river beds of the south side are also in marked contrast to the overflowing, bounding streams on the north side.

As above intimated, there exist in Porto Rico some interesting and seemingly valuable waterfalls. Among the best known and perhaps the most important, we may mention the following, viz;

Salto de Rio de la Plata, near Comerio; Salto Rio Blanco; Salto Morones, in Arecibo River, near Utuado; Salto Maldonado, in Arecibo River; Salto Sanchez, in Arecibo River; Salto Palmieri, in Arecibo river; and Salto Paso Palma, in Yayuya.

A franchise has just been granted for the development of the first-mentioned fall, the object being to utilize its power to operate a railroad from Catano to Ponce. Promoters are also investigating some of the other falls with a view to their development for electrical plants and other purposes. We hope soon to be able to present some details as to the size of the above-mentioned falls, their available power, and other information relative thereto of value to engineers and agriculturists.

NOTES AND EXTRACTS.

TROMHOLT'S CATALOGUE OF NORWEGIAN AURORAS.

No one has labored more faithfully to elucidate the problem of the aurora than Dr. Sophus Tromholt of Rostock, Norway, who died April 17, 1896.

Among his most important works was that done when he, in 1882–83, personally occupied a station at Koutokeino, in Finmark, Norway, in order to study the auroras observed by the Norwegian party at Bossekop, Norway, and the Finnish party at Sodan-Kyla. Tromholt was about 66 miles south of Bossekop, and 190 miles northwest of Sodan-Kyla, and observations of the auroras were made at all three stations at prearranged moments of time for the express purpose of determining their altitudes. The results of these special observations have as yet been only partially published.

In Petermann's Mittheilungen, 1892, Vol. XXXVIII, Tromholt published a preliminary report on two important works that he then had in hand, namely, a complete catalogue of the observations of auroras, as recorded by Norwegian ob-

servers since the year 1594, with special descriptions of the more important auroral displays and a general analysis of the reports. As it seemed likely that there would be a long delay in the publication of this important work, the summaries given by Tromholt in this preliminary communication were extremely welcome. My personal interest in the matter even led me to offer to supervise the publication in America of the original work, since the author had failed to find a publisher in Europe, but his early death closed our negotiations in this respect and it appears that his manuscript was subsequently given by his widow to his friend J. Fr. Schroeter for the purpose of publication in Norway, if possible. This desire has now been realized, and the publication at the joint expense of the Academy of Sciences at Christiania and the Fridtjof-Nansen Fund, as recommended by Professor Dr. Mohn, is a valuable addition to our knowledge of the aurora borealis.

This volume is a quarto of 422 pages of text besides the preface. In addition to the preface by Schroeter, there is also one prepared by Tromholt, from which we learn that he began the work of making this collection in 1879 and did not shrink from the great labor of examining general historical and archæological works, public and private libraries, and the archives of about a dozen public institutions, including the university library at Leipsic. Especial attention was given to Norwegian newspapers. In all cases the complete records of details were copied. The dates are always reckoned, as in astronomy, from noon to noon; the four subdivisions of Norway are: I, north of 68° 30′; II, between 68° 30′ and 65°; III, between 65° and 61° 30′; IV, south of 61° 30′. The total number of stations from which observations have been gathered is 216 and the total number of sources of information referred to in the catalogue is about 300.

Under the editorship of Schroeter, the material collected by Tromholt has been judiciously sifted and apparently nothing has been published that is not a distinct addition to exact knowledge. Especially must we approve of Schroeter's good judgment as an editor in restricting the publication of detailed descriptions, partly because so many are given in the publications of the International Polar Research, 1882–83, by expert physicists that nothing more would seem to be necessary; partly because there is abundant reason to think that the same aurora presents different aspects to observers a few miles apart, so that the mass of details must be useless until we understand more about the location and origin of the phenomena.

The list of auroras (Catalogue D) begins with September 27, 1594, and ends with April 22, 1878, covering 310 pages, and giving about 9 000 observations on nearly 6 000 different auroral dates. For each date is given the age of the moon, the place and time of observation, a few words of description, and a reference to the source of information. In the second section, special descriptions are given of suspected auroras, from 1550 to 1569, and of auroras proper from 1739 to 1878. In the third section, Table A gives the monthly and annual sums of the days on which auroras were observed somewhere in Norway. The auroral year, like the snow year, is reckoned from July to June, inclusive. The annual sums are then transformed into smoothed numbers by the formula $1/10\ (a + 2b + 4c + 2d + e)$. The annual sums are also given for each of the four sections into which the author subdivides the area of Norway. On page 352 these annual sums, from 1761 to 1878, are combined into one total, representing the monthly distribution of 5 891 days with auroras. This computation is given for each of the four subdivisions, as well as for all Norway. The monthly sums are also converted into comparable percentages by reduction to a uniform summation of 1 000, whence it appears that in the northernmost division of Norway the annual periodicity shows a maximum at the winter solstice, whereas in the southernmost section two maxima occur corresponding to the equinoxes. Therefore, in the northern portion of Norway the annual periodicity is of the same character as in the arctic regions generally. The annual period prevailing in the southern division of Norway is similar to that found in all middle latitudes. A combination of all the records of Tromholt for Norway, and Rubenson for Sweden, is given on pages 353–414, for the years 1722, March 4, to 1878, April 22. The study of the geographical distribution of these observations shows again a maximum in January in the northern regions, and maxima about September 21 and March 21 in the southern regions.

In the third part of the volume Schroeter has presented us with a new and complete recomputation of the preliminary discussion found among the papers of Tromholt, so that the figures differ somewhat from those published by the latter in Petermann's Mittheilungen. Especially has he omitted the attempt to investigate the apparent periodicity of the aurora due to the obscuration by the varying brightness of the moon, since such an investigation can not lead to any satisfactory result, unless the cloudiness of the sky has been recorded uniformly throughout many lunar months. For the same reason the study of the annual periodicity must be omitted, but we do not at first see why a similar argument would not hold good against the investigation of the sun-spot period which Schroeter has undertaken. Notwithstanding the imperfections of his data, Schroeter concludes that the results for Norway are in general quite parallel to those deduced by Rubenson from the observations in Sweden.

It is not likely that this great work of Tromholt's, taken in conjunction with its predecessors, exhausts all accessible European records, but it goes a long way toward preparing for a renewal of the comprehensive studies of the geographical and chronological distribution of auroras that were initiated by Fritz fifty years ago.—*C. A.*

MARYLAND CLIMATOLOGY.

Dr. O. L. Fassig communicates to the Library of the Weather Bureau copies of the short paper on the climate of Cecil County, Md., just now published as a part of the volume of the Maryland Geological Survey on the Geology of Cecil County. A third pamphlet on the climate of Garrett County is now in press. A similar report on Allegheny County was published in 1900. The plan is to take up each county of the State in turn and tabulate and discuss all the meteorological observations that have been made at any time in the history of the county, but especially those made under the auspices of the Smithsonian Institution, 1848–1873, the Weather Bureau, 1870–1902, and the Maryland State Weather Service, 1896–1902. The expense of publication is met by the Maryland Geological Survey. Each climatic sketch forms a chapter in the volume on the geology of the respective counties, In this way the local peculiarities of each portion of the State will be thoroughly presented.

Cecil County is in the extreme northeast section of the State of Maryland. Its surface is most gently undulating with a general elevation of about 300 feet, but occasionally rising to 500. The tide waters of Chesapeake Bay penetrate every portion of the southern part of the county. The principal records discussed in this pamphlet are those of Woodlawn from 1865 to 1875, inclusive, at which station the maximum temperature of 100° occurred once, in July, 1868, and the minimum temperature of —10°, also once, in January, 1873. The maximum monthly precipitation was 11.81, in August, 1874, and minimum monthly was 0.36, in October, 1875.—*C. A.*

WEATHER BUREAU MEN AS INSTRUCTORS.

Mr. J. R. Weeks, Observer, United States Weather Bureau, Macon, Ga., reports that he gave an informal lecture on the

instruments and work of the Weather Bureau to the class in physical geography of the high school in that city on November 4.

Mr. Charles Stewart, Observer, United States Weather Bureau, Spokane, Wash., reports that on March 21 he addressed the pupils of the Spokane High School, on Weather Changes and their Causes. On April 21 and 22 the pupils visited the Weather Bureau station and were instructed in the nature and use of the apparatus and in other matters connected with meteorology.

Mr. J. B. Marbury, Section Director, Atlanta, Ga., writes, as follows:

On November 13 of this year I delivered a lecture to a class at the Boys' High School in this city. My subject was "The Weather and the science of forecasting." My talk was mainly a preface to others that I have promised to give from time to time as my duties will permit. Much interest was shown in my remarks, which the teacher has since informed me made a deep impression upon his class. The increasing interest shown in the Bureau is, I think, largely due to the lectures and talks given from time to time by the various Weather Bureau officials throughout the country.

SAMUEL B. PFANNER.

In the death of Observer Samuel B. Pfanner, which occurred at Toledo, his native city, on November 2, 1902, the Weather Bureau sustains the loss of a faithful and efficient member of its observing force. Mr. Pfanner was born May 31, 1852. He entered the Weather Service September 2, 1890, and performed duty at Chicago, Ill., Cincinnati, Ohio, New Orleans, La., San Antonio, Tex., and Toledo, Ohio. Recently, his health failing him, his transfer to Phoenix, Ariz., was promptly arranged for at his request, but his illness took a sudden change for the worse, and he died before he could execute the official orders for his transfer which he had received.—*D. J. C.*

AUSTRALIAN DROUGHTS AND THE MOON.

Mr. H. C. Russell, Director of the Observatory at Sydney, New South Wales, has published in the Journal and Proceedings of the Royal Society of New South Wales, for the year 1901, a memoir on the relation of the moon's motion in declination and the quantity of rain in that colony, in which the author concludes "that rain is clearly shown to come in abundance when the moon is in certain degrees of her motion south; but when the moon begins to go north then droughty conditions prevail for seven or even eight years. This phenomenon repeated for three periods of nineteen years each constitutes a marvellous coincidence such that there must be a law connecting the two phenomena."

The influence of the moon on the weather is a matter that will not be downed by the exercise of any amount of common sense. According to the most ancient notions, the moon ought to have and must have a controlling influence in excess of the sun's, and every one who seeks to demonstrate its power is liable to become infatuated with the study. The moon has so many variations north and south of the equator, north and south of the ecliptic, to and from the earth, from new moon to full moon, conspiring with the sun and opposing the sun, that it does seem as though one ought to be able to make its periodical oscillations agree with some of the many variations in the aspect of the weather. However, we know of but one relation between the moon and the earth's atmosphere that can be said to have been settled upon a rational basis and that is the matter of atmospheric tides. Laplace stated that the semidiurnal lunar tide in the atmosphere ought to amount to about 0.003 inches of barometric pressure for equatorial stations, and this agrees with the results of observations carried on at Batavia, Java. His formulæ also showed, although we believe he did not state the fact, that as the moon moves north and south of the equator monthly, there ought to be a fortnightly tide, or a general pull of the atmosphere southward for two weeks and northward for two weeks. This we believe was first demonstrated as an observable quantity by A. Poincaré, a civil engineer of Paris and a member of the Meteorological Society of France. From his articles published by that Society in 1885–1888, we learn that the average barometric pressure on parallels of latitude around the whole globe, as measured on the International Maps published by the United States Weather Bureau, give the following results: The pressure on latitude 40° minus that on latitude 10° is + 1.88 millimeters when the moon is in the extreme south and + 4.82 millimeters when the moon is in the extreme north. The normal difference is + 3.35. This indicates that when the moon is furthest north there is a slight accumulation of atmosphere in the Northern Hemisphere, amounting to an increase of 1.47 millimeter, or 0.06 inch of pressure on the parallel of 40°.

Now, all lunar phenomena go through rather rapid periodic changes. What happens in one part of a lunar month is offset by an opposite effect in the other half of that month, or what happens at the time when the sun and moon conspire is offset by an opposite effect a few months or years later when the sun and moon oppose each other. When the moon is far south and begins to go north, according to Mr. Russell, droughty conditions prevail and continue for seven or eight years. But the strange part is that the moon begins to go north from her extreme southern position every month without exception, not only just before the seven or eight year drought, but during the whole of that long period, and continues to do so during the whole of the succeeding rainy period. How can her beginning to go north be rationally supposed to be a basis for predicting droughts in one case and rains in another?

But if we lay aside all these vagaries about the moon, and recognize Mr. Russell's meteorological induction that droughty conditions do prevail for seven or eight years in Australia, followed by years of rain, and that this cycle of droughts and rains has been repeated about three times since 1840, then, we have a fair observational basis upon which to build a rational explanation. Now, this periodicity, or rather the irregular succession of good seasons and bad seasons is a fact recognized in every portion of the world. We have also enough data to show that in most cases a drought in one portion of the globe is accompanied by rains in other portions, and that the regions of excess and deficiency of rain move over the surface of the globe month by month and year and year. They do not move in courses so nearly parallel as to justify long range predictions any more than do our storm centers, but the movements are certainly governed by laws, and we can begin to generalize as a first step in the process from induction to deduction. For instance, floods in the upper Nile, due to rains in the highlands of central Africa, mean that an unusual proportion of moisture has been taken from the southeast trade wind current, and that, therefore, when that has turned northeastward over the Indian Ocean, and has become the southwest monsoon of India, it will bring droughts over the western portion of that country. A drought in New South Wales, or on the southeast side of Australia, means a deficiency in the easterly winds blowing on that coast, and especially so in the rainy season, or December, January, February, and March. But this means that the great area of high pressure over the Indian Ocean at latitude 30° south has been pushed farther west than usual, or in other words that the general circulation of the atmosphere in that region has been disturbed. Now, such a disturbance, continued over several months or even years, can hardly be produced by the rapidly changing moon; it might be due to secular changes in the quantity and quality of the solar heat, but is most of all, likely to be simply the result of accumulations of pressure, temperature, and moisture in various portions of the earth's atmosphere. Australia has about the same area as the United States, but lies on the average

about 15° nearer the equator. This latter feature gives it soil temperatures and monsoon influences similar to those that prevail in northern Africa, so that it may itself produce an appreciable disturbance of the general circulation in the southern half of our atmosphere. But the principal cause of the droughts in Australia and India is undoubtedly to be found in the changes going on periodically in the relation between the general atmospheric pressure and resultant circulation in the south and in the north, or between Cape Colony and Australia, China and eastern Siberia. In this large portion of the globe a system of circulation prevails that is affected but comparatively little by what goes on to the west of it and north of it. A large quantity of air enters into this region from the Antarctic Ocean and passes out of it as the southwest monsoon of southern Asia to eventually become the westerly winds of the North Pacific. We may, therefore, look for some connection by this roundabout way between the droughts and rains of Australia, or southeastern Asia, and those of northwestern America.—*C. A.*

SHADOW BANDS; SCINTILLATION; INTERFERENCE BANDS.

Among the optical phenomena observed in the atmosphere the shadow bands seen on the ground during total solar eclipses just before the beginning and just after the end of totality have excited considerable attention. During the total eclipse of May 28, 1900, they were made the special subject of investigation in connection with Weather Bureau work, as it is highly probable that they originate in the earth's atmosphere. It is very rare that there do not exist in the atmosphere ascending and descending currents of air, which may be on a very minute scale as well as on a large scale. We conceive of the atmosphere as filled with minute masses of smaller density slowly ascending amidst equally minute descending masses of greater density. This mixture of rarer and denser portions produces in general a loss of light and a diminution of sound, which we know under the familiar name of heat-haze and acoustic opacity, respectively. Another effect is perceived when one views a minute source of light, such as a fixed star, and notices that it is apparently wobbling in all directions irregularly. This is undoubtedly due to the irregular refractions of the ray of light, which is bent out of its course by having to pass through so many curved surfaces separating the masses of warm air from those of cold air. In addition to refraction, the ray of light is also subject to prismatic dispersion, and the star is seen to oscillate in color from blue, through green and yellow, to red, especially when it is low down in the horizon. The existence of this mixture of small masses of air having different degrees of refracting power is also very prettily shown when we look at a white surface illuminated by a bright point, such as the electric light. In this case we see the white surface, not of a uniform tint, but spotted all over with dark and bright patches, which are in constant motion corresponding to the movements of the mixed cold and warm currents.

During the progress of a total eclipse the sun's disk is for a few minutes before and after the totality reduced to an exceedingly thin, bright circular arc, whose light throws upon a bright wall, or a white sheet laid upon the ground, visible shadows perfectly analogous to those just referred to as cast by the electric light; the principal differences arise from the fact that the eclipse happens during the warmer daytime and that the sunlight comes from a considerable angular altitude, whereas in the electric light we observe during the cooler night-time, and the beam of light is nearly horizontal and passes through only a small thickness of the lower air. If there were minute waves on a horizontal surface separating two strata of air at some distance above us, then the sunlight refracted at this wave surface would produce simple bands of shadow on the ground analogous to the shadows of the ascending warm air. This is a possible phenomenon, but not one that is likely to occur without being combined with the more important phenomena due to ascending currents analogous to waves in a vertical plane. To these combined horizontal and vertical waves we owe the phenomena of scintillation that have been most patiently observed by Montigny, in the hope of deriving therefrom some additional knowledge of the conditions prevailing in the upper air. But the investigations made, by means of the scintillometer, and especially the complete explanation by Exner and Pernter, of the origin and nature of scintillation have shown that but little of any value to dynamic meteorology can be expected to be derived from this study, although it is important to astronomy. The eclipse of May, 1900, added considerably to the observational data on the shadow bands or the dark fringes, as they are sometimes called. Among the articles written on the subject we note one by G. Johnstone Stoney in the Monthly Notices of the Royal Astronomical Society, vol. 60, p. 586. A memoir by Señor V. Ventosa, Astronomer at the Madrid Observatory, is summarized on page 86, vol. 62, 1900, of the English journal Nature, as follows:

> The examination of the observed facts appears to support the view that these shadow phenomena are not diffraction fringes bordering the actual shadow of the moon, but are produced in the body of our own atmosphere and are affected by the direction of the wind.
>
> Señor Ventosa has been occupied for some time in studying the currents in the higher regions of our atmosphere by observing the undulations round the sun and stars with a telescope, and thinks that these upper atmospheric currents may possibly have some bearing on the question of the eclipse shadow bands; the movement of these higher portions showing through the quieter lower strata, and being rendered visible on account of different refractive powers. He thinks it would be useful to determine the velocity of these currents by anemometers at various altitudes, and also to observe the undulations round the limb of the sun at the time of eclipse, comparing them with the shadow bands in direction and velocity of movement. To ascertain if any experimental illustration of this hypothesis could be presented, he states that bands may be produced by passing diffused light reflected from a sheet of corrugated glass through a circular aperture representing the sun, over which an opaque disk, representing the moon, is made to slide. When the segment left uncovered is about 5 mm. in width, alternate bright and dark bands can be observed on a white screen held near, if the length of the segmental opening is approximately parallel to the undulations of the glass; but if at right angles they entirely disappear. * * * This hypothesis shows the advisability of recording the direction and velocity of the wind during eclipses.

The subject of the shadow bands has been especially considered by Prof. F. H. Bigelow in the third chapter of his Eclipse Meteorology and Allied Problems. On page 57, after the collation of observations at many stations, he says:

> The direction of the cusps of the visible arc of the sun and the direction of the shadow bands are generally parallel to each other, and this direction varies distinctly between the center of the path of totality and the edge of the path, yet, keeping up the same parallelism. These two geometric facts are practically decisive in regard to the origin of the bands * * *. We, therefore, dismiss the diffraction theory from further consideration. We are, therefore, brought to conceive of the umbra [or central blackest portion of the moon's shadow] as surrounded by semiopaque rings * * * of such a character that the crescents of the sun's disk will cast down images upon the ground through a flickering and wavy medium. The width of the bands was found to be on the average 1.37 inches before totality, and 1.21 inches after totality; the widths of the bright spaces were 2.15 inches before and 2.24 inches after totality.

Owing to the irregular refractions of sunlight passing through a mixture of small masses of warm and cold or dry and moist air, the air must contain an immense number of small beams of light slightly inclined to each other and some of these produce what are known as optical interference. This subject is explained fully in all treatise on physical optics (see also Watson's text-book of physics). Interference is the cause of numerous well-known phenomena, such as the colors seen on irridescent mother of pearl and the magnificent ruled gratings of Rowland; also the so-called colors of thin plates seen in

soap bubbles or between plates of glass when pressed together and in films of oil on water. The diffraction rings seen about a bright light when viewed through a dusty atmosphere, or through a very narrow slit are also cases of optical interference.

In general we may say that when a wave of light has just arrived at any surface every atom of that surface is at that moment just beginning its minute vibration that produces in the human eye the effect called light. Each of these atoms not only oscillates to and fro, but also sets in motion the atom next in front of it, with, however, an appreciable lag in time. From each atom there proceeds a series of oscillations such that all atoms at the same distance from the initial one just begin to move at the same moment. The distance between two atoms that are in the same phase of motion is the length of a wave of light. The atoms that are just beginning to move in the same direction at the same moment make up a wave front. The vibrations proceeding from the atoms in a wave front often interfere with each other. Two beams of light inclined at a small angle to each other may produce brightness in some portions of the region where they interfere with each other and darkness in another portion, so that the whole space may be filled with alternating bright and dark regions. If the beams are stationary, then, these bright and dark patches will also be so, but if the beams are moving or flickering the dark patches will have corresponding motions. Analogous quiet patches are observed when waves of water or of sound interfere with each other.

If we look through a very perfect telescope at a bright star we shall see the flickering movements peculiar to the beams of light passing through the earth's atmosphere. If we pull the eye piece of the telescope forward, so as to convert the sharp image of the star into a large circular blurr, we shall obtain virtually a small image of the condition of affairs. If the glass is imperfect, we shall see its imperfections. If the air, either of the atmosphere beyond the glass or within the tube of the telescope, has any imperfection as to homogeneity, we shall see its effect, since it will produce slightly convergent rays of light, and resulting interferences, and we shall see bright and dark spots or bright and dark bands covering the surface of the lens. As these atmospheric imperfections are usually in motion, either horizontally with the wind, or vertically, because of temperature or irregular eddies, therefore, the bands and spots will appear in motion across the lens. It would not be fair to consider this motion as an indication of the direction of the wind unless we are sure that it is caused by the wind only and is not affected by any vertical convection.

The frequency of the oscillations of the beams of light is best studied by the use of the scintillometer, which is a simple device by means of which the sharp well defined image of the star is made to move around the field of view rapidly in a circle. We at once perceive this circle broken up into parts or bright lines separated by dark spaces: if the image of the star is made to rotate rapidly enough, we may easily count the number of alternations of brightness and darkness per second, corresponding, therefore, to the number of small masses of warm and cold air that have passed across the line of sight in that time.

The character of the interference phenomena may also be studied by photographing the diffuse image of the star, as has been done by A. E. Douglass, at the Lowell Observatory, Flagstaff, Arizona, a report on which was published by him in the American Meteorological Journal, March, 1895, Vol. XI, pp. 395–413. He states that his first observation at that observatory, September 28, 1894, showed that a swift northeast and a slow north or northwest current were present. The distance between the bands as they crossed the objective he called the "breadth of the wave;" but this "wave" is simply the optical appearance on the object glass and has no known connection with the waves of the atmosphere. It is a resulting optical effect, and it would be a mistake to hastily adopt the conclusion that we are observing waves in the upper air due to the wind; we observe only the "interference bands." When the sun shines through a basin of water whose surface is in wavy motion, lines or spots of brightness and darkness are seen at the bottom of the vessel, and these do have some simple relation to the wave surfaces, but this is not the case with the interference bands observed by Mr. Douglass's method. It is possible that by long-continued study of these telescopic phenomena one may be able to deduce important information with regard to the condition of the atmosphere, and there is reason to hope that Mr. Douglass's observations at Flagstaff will be repeated in other localities. He himself has stated that his "waves" change their size in the presence of clouds and that their motions have some connection with the lower isobars. The method of determining the distance or location of the atmospheric disturbances devised by Mr. Douglass seems to us to need revision. We are simply observing one set of interference bands out of the myriads that must exist between the eye and the source of disturbance.

In an article in the Monthly Notices of the Royal Astronomical Society for November, 1902, Mr. Percival Lowell, Proprietor and Director of the late Flagstaff Observatory, announces that expeditions should be sent to various portions of the globe in order to ascertain where atmospheric conditions are most favorable for the best astronomical work. Speaking of what constitutes satisfactory or unsatisfactory vision of the celestial bodies, he says:

> Studies directed to that end have resulted in a knowledge of the conditions which constitute good or bad seeing. * * * The basis of the matter lies in the discovery that systems of waves traverse the air, several of these systems being present at once at various levels above the earth's surface. The waves composing any given system are constant in size and differ for the different currents all the way from a fraction of an inch to several feet in length. If the wave be less than the diameter of the object glass from crest to crest, the image is confused by the unequal refraction from the different phases of the wave; if the wave be longer than this, a bodily oscillation of the whole image results. The first is fatal to good definition, the second to accurate micrometric measurement.
>
> It is possible to see these waves by taking out the eyepiece and putting one's eye in the focus of the instrument when the tube is pointed at some sufficiently bright light. It is further possible to measure their effect by carefully noting the character of the spurious disk and rings made by a star and the extent of the swing of the image in the field of view. By combining the amount of confusion with the degree of bodily motion of the resulting image the definition at any time and place can be accurately and absolutely recorded.
>
> The increasing perfection of the optical image of a star testifies to the increasing lack of damaging currents with reference to the object glass used. It records all the waves below a certain wave length. Similarly the amount of bodily motion registers all those above that length. The two taken together give account of all the currents independent of the glass.—*C. A.*

METEOROLOGICAL STATIONS IN AFRICA.

We take pleasure in announcing that, in connection with the work of the Georgetown College Observatory, in charge of Rev. J. G. Hagen, S. J., an auxiliary observatory is to be established by Rev. Edmund Goetz, S. J., at Buluwayo, Rhodesia, South Africa. This new station will attend to meteorology as well as to astronomy, and will be in latitude 20.5° south, longitude 29° east. The meteorological observatory at Kimberley, in charge of J. R. Sutton, and known as the Kenilworth Observatory, is in latitude 26.5° south, and longitude 25° east. The station Zomba in British Central Africa is in latitude 15° 22′ south, and longitude 35° 18′ east, or a few degrees south of Lake Nyassa, at an altitude of 2,948 feet. These few stations are but samples of the hundreds that are now being occupied throughout those portions of Africa that are accessible to modern civilization.—*C. A.*

ANALOGOUS STORMS.

A correspondent inquires whether the cyclones that enter the United States via Arizona and New Mexico are West Indian hurricanes of low intensity, which have swung across Mexico, and whether the cyclones which come to us via British Columbia are East Indian typhoons that have crossed the North Pacific?

We believe that it is generally agreed that a West Indian cyclone is one that originated in or near, and moves through or near the West Indian region. It would be a violent extension of this definition to apply this term to storms that do not come anywhere near the West Indies; in the same way we should object to speaking of the storms that cross over British Columbia as East Indian typhoons, unless it can be shown that they really come from the East Indies. We believe there is but one case plausibly established, in which an East Indian typhoon did continue uninterruptedly to the coast of British Columbia, and also one case of a West Indian hurricane that can be traced to the coast of Norway. But these are entirely exceptional.

Cyclonic storms most frequently pursue certain routes, which are shown in Weather Bureau Bulletin A. The diagrams copied from that will be found in many text-books, but while these favored routes extend over large portions of the globe, yet no one storm continues long enough to pursue the whole route. An East Indian typhoon, or a West Indian hurricane, after moving along for a week or two dies away, and is soon replaced by a new storm, for storms may originate anywhere within these favored routes. It is not at all likely that a West Indian hurricane, originating near the coast of Africa, can have any nearer relationship than that of cousin to the storms that begin as low pressures in the Gulf of California, and advance eastward over Arizona and New Mexico. They are analogous but not identical.—*C. A.*

CORRIGENDA.

MONTHLY WEATHER REVIEW, September, 1902, page 472, Table 1, in the last three columns insert the following totals: 257.8; 322.2; 72.18, respectively.

MONTHLY WEATHER REVIEW, April, 1902, page 230, column 1, footnote (a) should read "published by the United States Congress in 1901 in the Report ..... on Deep Waterways, 56th Congress, 2d Session, House Doc. No. 149."

In all previous REVIEWS, in Table 4, The Climatology of Costa Rica, in columns 2, 3, and 4, read "millimeters" for "inches." In same table for October, 1902, column 4, for "75.73 mm." read "757.30 mm."

SERIAL NUMBERS FOR WEATHER BUREAU PUBLICATIONS.

Many inquiries are received by the Weather Bureau officials as to the meaning of the serial numbers (e. g., W. B. No. 276) usually printed in the upper left-hand corner of the cover or title page of the Weather Bureau publications. In 1895 a Departmental order or circular was issued requiring that a serial number be given to every Weather Bureau publication that has a full title page or cover. By counting up previous publications it was concluded that the first publication of 1895 should be numbered 60; the publications previous to that date probably exceed this number, but that is of little consequence as they have never received whatever serial number properly belonged to them. The series includes all folio, quarto, and octavo bulletins, annual reports, and the successive numbers of the MONTHLY WEATHER REVIEW. As the numbers beginning with January, 1895, have been given to all publications of importance, except lithograph maps, those who desire to obtain a complete set of Weather Bureau publications are tempted to call for all these serial numbers; but this is unnecessary because so many of them are absorbed in the successive volumes of the MONTHLY WEATHER REVIEW, and others consist of instructions relative to instruments that can hardly be of general interest. At first the separate prints from the MONTHLY WEATHER REVIEW received a title page and serial number, but since December 21, 1898, this has not generally been done. A careful examination of the following list will show the reader whether any given serial number is likely to be of value to him, or worthy of a place on the shelves of a library. The authors of bulletins and of separate reprints from the MONTHLY WEATHER REVIEW are mentioned by name. In other publications the author's name is not so important and is omitted. The asterisk signifies that no copies remain for distribution.

60. Monthly Weather Review for January, 1895. Vol. XXIII, No. 1.
61. * Instructions to Observers and Code for Enciphering Reports at Cotton Region and Sugar and Rice Stations of the Weather Bureau.
62. Monthly Weather Review and Annual Summary for 1894. Vol. XXII, No. 13.
63. * E. B. Garriott. Studies of Weather Types and Storms. No. 1.—Types of Storms in January. Extract from Monthly Weather Review.
64. Monthly Weather Review for February, 1895. Vol. XXIII, No. 2.
65. Monthly Weather Review for March, 1895. Vol. XXIII, No. 3.
66. C. F. Marvin. Instructions for use of Maximum and Minimum Thermometers. Circular B. Revised Edition.
67. C. F. Marvin. Instructions for use of The Rain Gage. Circular C. Revised Edition.
68. Monthly Weather Review for April, 1895. Vol. XXIII, No. 4.
69. * Climate and Health. Number One.
70. Monthly Weather Review for May, 1895. Vol. XXIII, No. 5.
71. * Climate and Health. Number Two.
72. Monthly Weather Review for June, 1895. Vol. XXIII, No. 6.
73. * Climate and Health. Number Three.
74. Monthly Weather Review for July, 1895. Vol. XXIII, No. 7.
75. * Climate and Health. Number Four.
76. Monthly Weather Review for August, 1895. Vol. XXIII, No. 8.
77. Bulletin No 16. L. E. Jewell. The Determination of the Relative Quantities of Aqueous Vapor in the Atmosphere by Means of the Absorption Lines of the Spectrum.
78. * Climate and Health. Number Five.
79. Monthly Weather Review for September, 1895. Vol. XXIII, No. 9.
80. E. B. Garriott. Instructions to Wind-Signal [Storm Warning] Displaymen of the Weather Bureau.
81. O. L. Fassig. Statistics of State Weather Services. Extract from Monthly Weather Review.
82. * Climate and Health. Number Six.
83. Monthly Weather Review for October, 1895. Vol. XXIII, No. 10.
84. * Climate and Health. Vol. II, No. 1.
85. H. H. C. Dunwoody. Departures from Normal Temperatures and Rainfall, with Crop Yields in Nebraska.
86. * H. E. Williams. Injury from Frost and Methods of Protection.
87. * Display of Wind Signals on the Great Lakes.
88. * Bulletin No. 17. [Willis L. Moore.] The Work of the Weather Bureau in Connection with the Rivers of the United States.
89. * Monthly Weather Review for November, 1895. Vol. XXIII, No. 11.
90. Bulletin No. 18. [James Berry.] Report of the Fourth Annual Meeting of the American Association of State Weather Services, held at Indianapolis, Ind., October 16 and 17, 1895.
91. * Monthly Weather Review for December, 1895. Vol. XXIII, No. 12.
92. E. B. Garriott and others. Studies of Weather Types and Storms. Part II. Extract from Monthly Weather Review.
93. * Climate and Health. Vol. II, No. 2.
94. Monthly Weather Review and Annual Summary for 1895. Vol. XXIII, No. 13.
95. Monthly Weather Review for January, 1896. Vol. XXIV, No. 1.
96. * Climate and Health. Vol. II, No. 3.
97. * Bulletin No. 19. A. J. Henry. Report on the Relative Humidity of Southern New England and other localities.
98. Monthly Weather Review for February, 1896. Vol. XXIV, No. 2.
99. Monthly Weather Review for March, 1896. Vol. XXIV, No. 3.
100. Bulletin No. 13. H. E. Williams. Temperatures Injurious to Food Products in Storage and During Transportation, and Methods of Protection from the same. Reprinted as Farmers' Bulletin No. 125.
101. Monthly Weather Review for April, 1896. Vol. XXIV, No. 4.
102. * H. C. Frankenfield and A. J. Henry. St. Louis Tornado. Extract from Monthly Weather Review, 1896.
103. Monthly Weather Review for May, 1896. Vol. XXIV, No. 5.
104. Willis L. Moore. Responses to the programme of questions proposed for discussion at the International Meteorological Conference to be held in Paris, September, 1896.
105. Monthly Weather Review for June, 1896. Vol. XXIV, No. 6.
106. Monthly Weather Review for July, 1896. Vol. XXIV, No. 7.

107. Monthly Weather Review for August, 1896. Vol. XXIV, No. 8.
108. Monthly Weather Review for September, 1896. Vol. XXIV, No. 9.
109. C. F. Marvin. Instructions for the Care and Management of Sunshine Recorders. Circular G, Instrument Division.
110. *C. F. Marvin. Kite Experiments at the Weather Bureau. Extract from Monthly Weather Review.
111. Monthly Weather Review for October, 1896. Vol. XXIV, No. 10.
112. Park Morrill. Daily River Stages at River Gage Stations on the Principal Rivers of the United States. Part V, for the years 1893, 1894, and 1895.
113. Monthly Weather Review for November, 1896. Vol. XXIV, No. 11.
114. *Bulletin No. 20. F. H. Bigelow. Storms, Storm Tracks, and Weather Forecasting.
115. Monthly Weather Review for December, 1896. Vol. XXIV, No. 12.
116. Monthly Weather Review and Annual Summary for 1896. Vol. XXIV, No. 13.
117. Monthly Weather Review for January, 1897. Vol. XXV, No. 1.
118. Monthly Weather Review for February, 1897. Vol. XXV, No. 2.
119. Instructions for Voluntary Observers, 1897.
120. Monthly Weather Review for March, 1897. Vol. XXV, No. 3.
121. Monthly Weather Review for April, 1897. Vol. XXV, No. 4.
122. C. F. Marvin. A Monograph on The Mechanics and Equilibrium of Kites. Extract from Monthly Weather Review.
123. Monthly Weather Review for May, 1897. Vol. XXV, No. 5.
124. F. H. Bigelow. The Standard System of Coordinate Axes for Magnetic and Meteorological Observations and Computations. Extract from Monthly Weather Review.
125. E. B. Garriott. Wind Barometer Tables. Extract from Monthly Weather Review.
126. W. F. R. Phillips. Clothing and Temperature. Extract from Monthly Weather Review.
127. *T. Russell. Tables for obtaining the Temperature of the Dewpoint, Relative Humidity, etc. Extract from Instructions of 1892 to Voluntary Observers.
128. Monthly Weather Review for June, 1897. Vol. XXV, No. 6.
129. *Monthly Weather Review for July, 1897. Vol. XXV, No. 7.
130. J. Cottier. The Equations of Hydrodynamics in a Form Suitable for Application to the Earth's Atmosphere. Extract from Monthly Weather Review.
131. Monthly Weather Review for August, 1897. Vol. XXV, No. 8.
132. [N. B. Conger and A. J. Henry.] Instructions for Use of Aneroid Barographs on the Great Lakes.
133. [J. Berry.] Instructions governing the Corn, Wheat, Cotton, Sugar, and Rice Region Service.
134. J. H. Robinson. Instructions to Operators on the United States Seacoast Telegraph Lines.
135. Monthly Weather Review for September, 1897. Vol. XXV, No. 9.
136. A. J. Henry. Bulletin D. Rainfall of the United States, with Annual, Seasonal, and other charts. (Reprinted in the Annual Report for 1896–97.)
137. *Park Morrill. Monthly Report of the River and Flood Service for September, 1897.
138. Willis L. Moore. United States Daily Atmospheric Survey.
139. Report of the Chief of the Weather Bureau for 1897. 8vo edition. Also reprinted as Part I of the 4to edition of Report for 1896–97.
140. H. A. Hazen. Forest and Rainfall.
141. Monthly Weather Review for October, 1897. Vol. XXV, No. 10.
142. *F. H. Bigelow. The Probable State of the Sky Along the Path of the Total Eclipse of the Sun, May 28, 1900. Extract from Monthly Weather Review, 1897.
143. Bulletin E. Park Morrill. Floods of the Mississippi River. Also reprinted in Report of the Chief of Weather Bureau for 1896–97.
144. *Park Morrill. Monthly Report of the River and Flood Service for October, 1897.
145. S. P. Fergusson. The Highest Kite Ascensions at Blue Hill. Extract from Monthly Weather Review, 1897.
146. Monthly Weather Review for November, 1897. Vol. XXV, No. 11.
147. *Park Morrill. Monthly Report of the River and Flood Service for November, 1897. Extract from Monthly Weather Review, 1897.
148. D. T. Maring. An Improved Sunshine Recorder. Extract from Monthly Weather Review.
149. R. DeC. Ward. A Winter Barograph Curve from the South Pacific Ocean. Extract from Monthly Weather Review.
150. *Bulletin No. 21. F. H. Bigelow. Abstract of a Report on Solar and Terrestrial Magnetism in Their Relations to Meteorology.
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153. *Park Morrill. Monthly Report of the River and Flood Service for January, 1898. Extract from Monthly Weather Review.
154. Monthly Weather Review and Annual Summary for 1897. Vol. XXV, No. 13.
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158. Park Morrill. Monthly Bulletin of the River and Flood Service for March, 1898. Extract from Monthly Weather Review.
159. W. B. Conger. Wrecks and Casualties on the Great Lakes during 1895, 1896, and 1897.
160. Park Morrill. Monthly Bulletin of the River and Flood Service for April, 1898. Extract from Monthly Weather Review.
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162. A. J. Henry. Normal Annual Sunshine and Snowfall. Extract from Monthly Weather Review.
163. W. F. R. Phillips. Bulletin No. 22. Climate of Cuba; also, A Note on the Weather of Manila.
164. Park Morrill. Monthly Bulletin of the River and Flood Service for May, 1898. Extract from Monthly Weather Review.
165. Monthly Weather Review for April, 1898. Vol. XXVI, No. 4.
166. C. F. Marvin. Instructions for Aerial Observers. Circular K, Instrument Division.
167. C. F. Marvin. Instructions for Obtaining and Tabulating Records from Recording Instruments. Circular A, Instrument Division.
168. Rev. B. Viñes. Investigation of the Cyclonic Circulation and the Translatory Movement of West Indian Hurricanes. Extract from Bulletin No. 11.
169. Park Morrill. Monthly Bulletin of the River and Flood Service for June, 1898. Extract from Monthly Weather Review.
170. Monthly Weather Review for May, 1898. Vol. XXVI, No. 5.
171. C. F. Marvin. Moisture Tables. Extract from Monthly Weather Review.
172. Monthly Weather Review for June, 1898. Vol. XXVI, No. 6.
173. E. B. Garriott. Monthly Bulletin of the River and Flood Service for July, 1898. Extract from Monthly Weather Review.
174. Monthly Weather Review for July, 1898. Vol. XXVI, No. 7.
175. *E. B. Garriott. Monthly Bulletin of the River and Flood Service for August, 1898. Extract from Monthly Weather Review.
176. Monthly Weather Review for August, 1898. Vol. XXVI, No. 8.
177. E. B. Garriott. Monthly Bulletin of the River and Flood Service for September, 1898. Extract from Monthly Weather Review.
178. Monthly Weather Review for September, 1898. Vol. XXVI, No. 9.
179. *F. H. Bigelow. The Probable State of the Sky Along the Path of Total Eclipse of the Sun, May 28, 1900. Extract from Monthly Weather Review.
180. C. F. Marvin. Aneroid Barometers. Extract from Monthly Weather Review.
181. Report of the Chief of the Weather Bureau for 1898. Also reprinted as Part I of the quarto edition of the Report for 1897–98.
182. H. C. Frankenfield. Monthly Bulletin of the River and Flood Service for October, 1898. Extract from Monthly Weather Review.
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185. Monthly Weather Review for November, 1899. Vol. XXVI, No. 11.
186. *Bulletin No. 23. W. H. Hammon. Frost. When to Expect it and How to Lessen the Injury Therefrom.
187. *Bulletin No. 24. James Berry. Proceedings of the Convention of Weather Bureau Officials held at Omaha, Nebr., October 13–14, 1898.
188. H. L. Ball. Climate and Crop Report. Season of 1898. Alaska Section. Extract from Monthly Weather Review.
189. Monthly Weather Review for December, 1898. Vol. XXVI, No. 12.
190. Monthly Weather Review and Annual Summary for 1898. Vol. XXVI, No. 13.
191. Bulletin No. 25. Willis L. Moore. Weather Forecasting. Some Facts Historical, Practical, and Theoretical.
192. Monthly Weather Review for January, 1899. Vol. XXVII, No. 1.
193. C. F. Marvin. Measurement of Precipitation. Circular E, Instrument Division.
194. S. W. Corley. Hydrology of the Lake Minnetonka Watershed. Extract from Monthly Weather Review.
195. Monthly Weather Review for February, 1899. Vol. XXVII, No. 2.
196. Monthly Weather Review for March, 1899. Vol. XXVII, No. 3.
197. Bulletin No. 26. A. G. McAdie and A. J. Henry. Lightning and the Electricity of the Air. In two parts.
198. Monthly Weather Review for April, 1899. Vol. XXVII, No. 4.
199. A. J. Henry and A. G. McAdie. Property Loss by Lightning, in 1898.
200. Monthly Weather Review for May, 1899. Vol. XXVII, No. 5.
201. H. L. Abbot. Climatology of the Isthmus of Panama. Extract from Monthly Weather Review.
202. B. F. Sharp. An Advance in Measuring and Photographing Sounds. Extract from Monthly Weather Report.
203. *A. J. Henry. Variations in Lake Levels and Atmospheric Precipitation. Extract from Monthly Weather Review.
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205. Monthly Weather Review for July, 1899. Vol. XXVII, No. 7.
206. Report of the Chief of the Weather Bureau for 1899. Also reprinted as Part I of the quarto edition of the Report of 1898–99.
207. Monthly Weather Review for August, 1899. Vol. XXVII, No. 8.
208. Bulletin F. H. C. Frankenfield. Report on the Kite Observations of 1898.
209. Bulletin No. 27. F. H. Bigelow. The Probable State of the Sky

along the Path of Total Eclipse of the Sun, May 28, 1900. Observations of 1899.
210. Monthly Weather Review for September, 1899. Vol. XXVII, No. 9.
211. Bulletin No. 28. A. G. McAdie and Geo. H. Willson. The Climate of San Francisco, Cal.
212. Monthly Weather Review for October, 1899. Vol. XXVII, No. 10.
213. A. J. Henry and N. B. Conger. Meteorological Chart of the Great Lakes. Summary for the Season of 1899.
214. Monthly Weather Review for November, 1899. Vol. XXVII, No. 11.
215. Monthly Weather Review for December, 1899. Vol. XXVII, No. 12.
216. Monthly Weather Review and Annual Summary for 1896. Vol, XXVII, No. 13.
217. Monthly Weather Review for January, 1900. Vol. XXVIII, No. 1.
218. Monthly Weather Review for February, 1900. Vol. XXVIII, No. 2.
219. * Bulletin No. 29. A. G. McAdie. Frost Fighting.
220. Monthly Weather Review for March, 1900. Vol. XXVIII, No. 3.
221. Bulletin G. F. W. Very. Atmospheric Radiation.
222. Monthly Weather Review, for April 1900. Vol. XXVIII, No. 4.
223. C. F. Marvin. Anemometer Tests. Extract from Monthly Weather Review.
224. Monthly Weather Review for May, 1900. Vol. XXVIII, No. 5.
225. Monthly Weather Review for June, 1900. Vol. XXVIII, No. 6.
226. Monthly Weather Review for July, 1900. Vol. XXVIII, No. 7.
227. H. C. Frankenfield. Daily River Stages, at the River Gage stations on the Principal Rivers of the United States, Part VI., for 1896, 1897, 1898, and 1899.
228. H. C. Frankenfield. Tables of Daily Precipitation.
229. Monthly Weather Review for August, 1900. Vol. XXVIII, No. 8.
230. Monthly Weather Review for September, 1900. Vol. XXXVIII, No. 9.
231. Report of the Chief of the Weather Bureau for 1900. 8 vo. Also reprinted as Part I of the quarto edition of the Report 1899–1900.
232. Bulletin H. E. B. Garriott. West Indian Hurricanes.
233. C. F. Marvin. Anemometry. Circular D, Instrument Division. Second Edition.
234. Monthly Weather Review for October, 1900. Vol. XXVIII, No 10.
235. C. F. Marvin. Psychrometric Tables.
236. Monthly Weather Review for November, Vol. XXVIII, 11.
237. A. J. Henry and N. B. Conger. Meteorological Chart of the Great Lakes. Summary for the Season of 1900.
238. Monthly Weather Review for December, 1900. Vol. XXVIII, No. 12.
239. Monthly Weather Review. Annual Summary for 1900. Vol. XXVIII, No. 13.
240. Monthly Weather Review for January, 1901. Vol. XXIX, No. 1.
241. C. F. Marvin. Circular F. Barometers and measurement of atmospheric pressure. Instrument Division, Second Edition.
242. Monthly Weather Review for February, 1901. XXIX, No. 2.
243. Monthly Weather Review for March, 1901. Vol. XXIX, No. 3.
244. A. J. Henry and N. B. Conger. Meteorological Chart of the Great Lakes, No. 1, 1901.
245. Monthly Weather Review for April, 1901. Vol. XXIX, No. 4.
246. Monthly Weather Review for May, 1901. Vol. XXIX, No. 5.
247. Monthly Weather Review for June, 1901. Vol. XXIX, No. 6.
248. * D. T. Maring. Weather Bureau Exhibit at the Pan-American Exposition. Buffalo, N. Y., 1901. Reprint from Monthly Weather Review.
249. Monthly Weather Review for July, 1901. Vol. XXIX, No. 7.
250. Instructions to Voluntary Observers. Second edition.
251. Monthly Weather Review for August, 1901. Vol. XXIX, 8.
252. C. F. Marvin. Instructions for the Care and Management of Sunshine Recorders. Circular G, Instrument Division. (Second Edition of No. 109.)
253. Monthly Weather Review for September, 1901. Vol. XXIX, No. 9.
254. F. W. Very. The Solar Constant. Reprint from Monthly Weather Review.
255. Monthly Weather Review for October, 1901. Vol. XXIX, No. 10.
256. Bulletin No. 30. A. J. Henry. Loss of Life in the United States by Lightning.
257. Monthly Weather Review for November, 1901. Vol. XXIX, No. 11.
258. A. J. Henry and N. B. Conger. Meteorological Chart of the Great Lakes. No. 2, 1901.
259. Monthly Weather Review for December, 1901. Vol. XXIX, No. 12.
260. Monthly Weather Review. Annual Summary, 1901. Vol. XXIX, No. 13.
261. Monthly Weather Review for January, 1902. Vol. XXX, No. 1.
262. A. J. Henry. Bulletin J. Wind Velocity and Fluctuation of Water Level on Lake Erie.
263. Monthly Weather Review for February, 1902. Vol. XXX, No. 2.
264. A. J. Henry and N. B. Conger. Meteorological Chart of the Great Lakes. No. 1, 1902.
265. Bulletin No. 31. James Berry. Proceedings of the Second Convention of Weather Bureau Officials, held at Milwaukee, 1901.
266. Monthly Weather Review for March, 1902. Vol. XXX, Ko. 3.
267. Bulletin I. F. H. Bigelow. Eclipse Meteorology and Allied Problems.
268. Bulletin No. 32. W. H. Alexander. Hurricanes: Especially those of Porto Rico and St. Kitts.
269. Monthly Weather Review for April, 1902. Vol. XXX, No. 4.
270. Monthly Weather Review for May, 1902. Vol. XXX, No. 5.
271. Monthly Weather Review for June, 1902. Vol. XXX, No. 6.
272. Monthly Weather Review for July, 1902. Vol. XXX, No. 7.
273. * F. H. Bigelow. Studies on the Statics and Kinematics of the Atmosphere in the United States. Reprint from Monthly Weather Review.
274. Monthly Weather Review for August, 1902. Vol. XXX, No. 8.
275. Monthly Weather Review for September, 1902. Vol. XXX, No. 9.
276. Monthly Weather Review for October, 1902. Vol. XXX, No. 10.
277. C. F. Marvin. Instructions for Obtaining and Tabulating Records from Recording Instrument. Circular A, Instrument Division. Second Edition.
278. Monthly Weather Review for November, 1902. Vol. XXX, No. 11.

THE WEATHER OF THE MONTH.

By W. R. STOCKMAN, Forecast Official, in charge of Division of Records and Meteorological Data.

CHARACTERISTICS OF THE WEATHER FOR NOVEMBER.

Over the eastern two-thirds of the United States the month was unusually warm, with daily mean departures of +3.6° to +8.4° from the normal; in a number of the States it was the warmest November since the establishment of Climate and Crop services. In the Rocky Mountain slope districts the mean daily excess of temperature was not quite so large. In the Plateau and Pacific regions the average daily temperature ranged from normal to 1.6° below the normal by districts; but taking the States individually, California showed a daily mean deficiency of 2.4° and Arizona 2.5°.

The isotherm of 65° crosses northern Florida, Texas generally, and Louisiana, about latitude 30° north; of 70° over north-central Florida, and 75° over southern Florida. None of these three isotherms appeared on the chart for November, 1901. Generally east of the one hundredth meridian the remaining isotherms lay considerably northward of their position in November, 1901.

The precipitation was slightly below the normal in the Middle Atlantic and east Gulf States, Ohio Valley and Tennessee, North Dakota, and the northern slope; 1.6 inches below in the lower Lake region, and 2.9 inches below in New England. In the other geographical districts it ranged from normal to 3.5 inches above.

The relative humidity was normal in the Florida Peninsula and upper Lake region; 2 per cent below normal in North Dakota; and above normal from 1 per cent to 17 per cent in the remaining geographical districts, the most marked departures, + 12 per cent and + 17 per cent, occurring in the middle and southern slope districts, respectively.

The cloudiness was 5 per cent below the average in the lower Lake region, and from 5 per cent to 24 per cent above normal in the remaining districts, the greatest departures, + 22 per cent and + 24 per cent, occurring, as did the excess in relative humidity, in the middle and southern slope regions, respectively. In New England, and other districts where the precipitation was deficient, these conditions were anomalous.

PRESSURE.

The distribution of monthly mean pressure is shown graphically on Chart VI and the numerical values are given in Tables I and VI.

The area of highest mean pressure, with readings of 30.05 to 30.11 inches, overlay the eastern part of the west Gulf States and thence eastward and northeastward over the lower Lake region and New England to the Atlantic Ocean, the crest overlaying the Appalachian Mountain districts. Another high area, but of a somewhat lower pressure, overlay the mid-

dle California coast, northern California, and southern Oregon.

The mean pressure was low, less than 29.90 inches, in Arizona, southwestern New Mexico, and extreme southwestern Texas, also in western North Dakota, northern and eastern Montana and northwestern Washington, in which last-named region it was lowest, somewhat below 29.85 inches. In New England and the northern part of the Middle Atlantic States the mean pressure was slightly above the normal; in all other districts it was below normal, the greatest departure being over the northwestern quarter of the country. The pressure was higher than in October, 1902, in the Atlantic and east Gulf States, the lower Ohio, central Mississippi, and lower Missouri valleys, and west of the one hundred and tenth meridian of longitude and south of the forty-fourth parallel of latitude, the greatest changes occurring over Florida, northern and central California, and western Nevada.

TEMPERATURE OF THE AIR.

The distribution of monthly mean surface temperature, as deduced from the records of about 1,000 stations, is shown on Chart VI.

From the Gulf of Mexico northward into Canada and from the one hundredth meridian of longitude eastward to the Atlantic Ocean the temperature showed a mean daily departure of + 4.0° to + 9.7°. Over the greater portion of this area the departures were + 6° or more, with the greatest departures in the Ohio and central Mississippi valleys, lower Lake region, and the southern part of the upper Lake region.

The following States report it the warmest November on record: Indiana, Kentucky, Michigan, Ohio, Mississippi, and Missouri, except the northwestern section; and in New England and North Dakota it was exceeded but once. In North Carolina it was the warmest in twenty years, New Jersey in seventeen years, Kansas in sixteen years, West Virginia in twelve years, and Georgia since 1891. At Milwaukee, Wis., the mean temperature for the month was the highest in thirty-one years and at Green Bay in seventeen years, but in the western portion of the State it was slightly below the highest mean. At St. Louis, Mo., it was the warmest November, excepting one, in seventy-seven years.

The average temperature for the several geographic districts and the departures from the normal values are shown in the following table:

Average temperatures and departures from normal.

Districts.	Number of stations.	Average temperatures for the current month.	Departures for the current month.	Accumulated departures since January 1.	Average departures since January 1.
		°	°	°	°
New England	8	44.0	+4.2	+ 8.0	+0.7
Middle Atlantic	12	51.0	+6.3	+ 3.9	+0.4
South Atlantic	10	60.8	+5.8	+ 0.8	+0.1
Florida Peninsula*	8	70.1	+3.5	+ 3.3	+0.3
East Gulf	9	61.6	+5.4	+ 6.2	+0.6
West Gulf	7	62.7	+6.4	+11.8	+1.1
Ohio Valley and Tennessee	11	53.1	+8.0	+ 3.2	+0.3
Lower Lake	8	47.5	+8.4	+ 6.6	+0.6
Upper Lake	10	41.4	+8.0	+19.2	+1.7
North Dakota*	8	28.4	+5.3	+17.8	+1.6
Upper Mississippi Valley	11	45.7	+8.3	+10.7	+1.0
Missouri Valley	11	42.1	+5.2	+11.7	+1.1
Northern Slope	7	33.6	+0.9	+13.6	+1.2
Middle Slope	6	45.1	+3.8	+13.0	+1.2
Southern Slope*	6	52.9	+3.6	+14.2	+1.3
Southern Plateau*	13	45.3	−0.4	− 1.1	−0.1
Middle Plateau*	9	36.6	−0.9	+ 0.9	+0.1
Northern Plateau*	12	36.8	0.0	+ 5.4	+0.5
North Pacific	7	45.6	+0.2	+ 4.1	+0.4
Middle Pacific	5	52.6	−1.0	− 0.4	0.0
South Pacific	4	55.9	−1.6	− 5.8	−0.5

*Regular Weather Bureau and selected voluntary stations.

In Canada.—Prof. R. F. Stupart says:

A phenomenally high mean temperature prevailed over the region of the Great Lakes and thence westward to Manitoba and eastward in the St. Lawrence Valley to below Montreal, a positive departure of 7° being recorded in many localities, including Toronto, where continuous observations since 1830 show that the month just closed was the mildest November on record. Westward from Winnipeg the positive departure diminished to just normal at Swift Current, and over the greater part of Alberta and northern British Columbia there was a negative departure of 3° or more. In southern British Columbia the departure was from zero to 3° below the average. The more easterly portions of Quebec and the whole of the Maritime Provinces showed a positive departure from average of from 2° to 3°.

The first general killing frost or freezing weather occurred in New Mexico on the 3d; northern Indiana, 7th; northwestern Texas, 17th; central and southern Indiana, 23d; Kansas, 25th; and Georgia, Mississippi, and North Carolina, 28th. Heavy or killing frosts occurred in Louisiana and in parts of South Carolina on the 27th, and were general in the latter State on the 28th. The first ice was reported in South Carolina on the 28th.

Maximum temperatures of 80° or higher occurred in the greater portion of the Gulf States and in parts of the South Atlantic States, central Appalachian Mountain districts, central Mississippi and lower Ohio valleys, southern middle slope, and in western Arizona and southern California.

The isotherm of freezing temperature closely approached the south Atlantic and east Gulf coasts; retreated to the northward over the west Gulf States as far as extreme southern Arkansas and south-central Texas, and overlay south-central and southwestern Arizona and extreme southern California, and approached near to the coast of south-central and central California. The trend of the isotherm of zero temperatures was across northern Minnesota, eastern and extreme northwestern North Dakota and extreme northeastern Montana.

PRECIPITATION.

In central Florida, central Georgia, west-central California, west-central Nevada, and generally from northeastern Utah, southeastern Idaho and eastern Montana eastward to the Atlantic Ocean, excepting in eastern Minnesota, northern Wisconsin and upper Michigan, the precipitation was below the normal; elsewhere it was above the normal, the greatest excesses being from 2 inches to 4.8 inches in north-central and extreme southern Florida, and southeastern Georgia; 2 inches to 5.8 inches in northwestern Arizona; and 2 inches to 9.1 inches in eastern Texas, northern and western Arkansas, and Oklahoma and the Indian Territory, the greatest excess occurring in west-central Arkansas. In Missouri and Kansas the average amount of precipitation was the greatest during any November in twenty years, while in North Dakota it was the next to the least. Rainfalls in monthly amounts of from 10 inches to 22 inches were reported from eastern Texas, Oklahoma and the Indian Territory, southwestern Arkansas, and from northwestern California northward over the western parts of Oregon and Washington.

Snows occurred except along the Pacific, east Gulf and south Atlantic and Middle Atlantic coasts, and in the west Gulf States, the amounts, however, in the Middle Atlantic, South Atlantic and east Gulf States, Ohio Valley and Tennessee, and thence westward over Missouri and Kansas to eastern Colorado were generally but traces. In the mountain districts of California heavy snows occurred during the last week of the month. Snows occurred in some districts of Washington, and in nearly all sections of Idaho. The average amount of snowfall in Utah for the month was 7.9 inches, which was 4.2 inches above the normal.

At the end of the month snow remained on the ground in New England, the northern part of the Middle Atlantic States, the upper Ohio Valley, Lake region, the upper Mississippi and central Missouri valleys, North Dakota, and in the western mountains, but, as a rule, the amount was but small, except on the western mountains.

Average precipitation and departure from the normal.

Districts.	Number of stations.	Average.		Departure.	
		Current month.	Percentage of normal.	Current month.	Accumulated since Jan. 1.
		Inches.		*Inches.*	*Inches.*
New England	8	1.29	31	−2.9	−4.3
Middle Atlantic	12	2.54	83	−0.5	−1.4
South Atlantic	10	4.29	145	+1.3	−10.4
Florida Peninsula *	8	3.15	147	+1.0	+1.3
East Gulf	9	3.49	92	−0.3	−10.0
West Gulf	7	5.86	148	+1.9	−5.1
Ohio Valley and Tennessee	11	3.25	89	−0.4	−8.0
Lower Lake	8	1.53	49	−1.6	−1.2
Upper Lake	10	2.41	100	0.0	−2.8
North Dakota *	8	0.29	42	−0.4	+0.8
Upper Mississippi Valley	11	2.27	105	+0.1	+1.6
Missouri Valley	11	1.46	116	+0.2	+1.1
Northern Slope	7	0.38	79	−0.1	+0.1
Middle Slope	6	1.95	205	+1.0	+3.9
Southern Slope *	6	3.87	232	+2.2	+5.0
Southern Plateau *	13	1.82	253	+1.1	−0.8
Middle Plateau *	8	1.08	123	+0.2	−2.0
Northern Plateau *	12	2.41	141	+0.7	−1.0
North Pacific	7	10.03	154	+3.5	+3.5
Middle Pacific	5	4.88	149	+1.6	+3.1
South Pacific	4	1.84	137	+0.5	+0.1

* Regular Weather Bureau and selected voluntary stations.

In Canada.—Professor Stupart says:

The precipitation was apparently very nearly average in British Columbia, and at low levels it was almost entirely rain. In the Northwest Territories and Manitoba, where it was chiefly in the form of light snowfalls, it was also nearly average; in some localities slightly in excess, and in others, to a small extent, deficient. From Lake Superior eastward to the Maritime Provinces there was a very general and marked deficiency, in many districts not more than half the average amount being recorded. Until the last week, in Ontario and Quebec, the precipitation was almost altogether in the form of rain, but during the last few days snow fell to the depth of several inches in nearly all localities.

At the close of the month the mountains and northern portions of British Columbia were snow covered to a considerable depth; nearly all the prairies of the Northwest Territories and Manitoba had a light covering, and in parts of Saskatchewan the snow was reported to be deep. In Ontario the depth was from 2 to 6 inches, and in the northern and eastern parts of the province there was a light covering, while in the more southern and southwestern portions there were only patches here and there.

In Quebec the depth ranged from 2 or 3 inches in western districts to about 10 inches in the eastern portion of the province, while over nearly the whole of the Maritime Provinces the ground was bare.

HAIL.

The following are the dates on which hail fell in the respective States:

Arizona, 12, 29. Arkansas, 28. California, 1, 11, 12, 16, 18, 19, 29. Colorado, 12, 22, 23. Connecticut, 12, 24. Idaho, 16, 27. Illinois, 10. Indiana, 10, 16. Iowa, 1. Kentucky, 26, 30. Maine, 12, 13, 26. Massachusetts, 11, 26, 30. Michigan, 6, 7, 15, 22, 24. Minnesota, 4, 14. Mississippi, 24. Nebraska, 1. New Hampshire, 12, 13, 26, 27. New Mexico, 1, 22. New York, 11, 22, 23, 24, 26, 27, 30. North Dakota, 11. Ohio, 29. Oregon, 11, 16, 17, 18, 21, 24, 27, 28, 30. Pennsylvania, 26, 30. Rhode Island, 23. South Dakota, 12. Texas, 12, 15, 20. Utah, 7, 11, 12, 19, 21, 27. Virginia, 27. Washington, 2, 3, 8, 11, 12, 17, 18, 23, 24, 27, 30. Wisconsin, 14.

SLEET.

The following are the dates on which sleet fell in the respective States:

Alabama, 27, 28, 29. Arkansas, 18, 28. California, 16, 18, 19. Colorado, 1, 11, 12, 22, 24. Connecticut, 23, 30. Georgia, 26, 27. Illinois, 16, 26, 27, 28, 29. Indiana, 26, 27. Iowa, 13, 14, 23, 24, 26, 28, 30. Kansas, 10, 12, 24. Kentucky, 26, 27, 30. Maine, 12, 13, 19, 23, 26, 28. Maryland, 29, 30. Massachusetts, 11, 13, 25, 26, 27. Michigan, 6, 7, 11, 15, 26, 29. Minnesota, 11, 12, 13, 14, 26, 28. Mississippi, 26. Missouri, 26, 27, 28, 29. Montana, 3, 7, 8, 9, 11. Nebraska, 9, 10, 11, 12, 13, 14, 28. Nevada, 10, 19, 21. New Hampshire, 12, 23, 26, 27. New Jersey, 30. New Mexico, 22. New York, 2, 3, 12, 13, 23, 25, 26, 27, 28, 30. North Carolina, 27, 28. North Dakota, 11, 12, 13, 14, 19, 20. Ohio, 25, 26, 29. Oregon, 18, 28, 29. Pennsylvania, 25, 26, 29, 30. South Carolina, 27. South Dakota, 9, 11, 12, 20. Tennessee, 26, 27, 28, 30. Texas, 29, 30. Utah, 11, 14, 18, 19, 20, 21, 22, 23, 24, 27. Vermont, 13, 27, 28. Washington, 3, 6, 7, 8, 9, 10, 16, 17, 18, 23, 24, 27, 28, 29. West Virginia, 29, 30. Wisconsin, 2, 6, 9, 15, 26, 29. Wyoming, 7, 11.

WIND.

The maximum wind velocity at each Weather Bureau station for a period of five minutes is given in Table I, which also gives the altitude of Weather Bureau anemometers above ground.

Following are the velocities of 50 miles and over per hour registered during the month:

Maximum wind velocities.

Stations.	Date.	Velocity.	Direction.	Stations.	Date.	Velocity.	Direction.
Block Island, R. I	26	60	e.	New York, N. Y	28	60	nw.
Buffalo, N. Y	6	55	sw.	North Head, Wash	1	50	se.
Do	24	56	w.	Do	2	73	se.
Do	29	66	sw.	Do	7	52	se.
Do	30	60	w.	Do	9	62	se.
Cape Henry, Va	23	51	nw.	Do	10	60	se.
Carson City, Nev	18	60	sw.	Do	13	60	se.
Chicago, Ill	14	50	sw.	Do	15	52	s.
Do	23	52	sw.	Do	16	65	s.
Do	29	50	sw.	Do	17	72	s.
Miles City, Mont	9	60	n.	Do	27	50	nw.
Mount Tamalpais, Cal	8	60	se.	Do	28	62	nw.
Do	9	56	sw.	Do	30	60	s.
Do	16	70	nw.	Port Reyes Light, Cal	8	60	se.
Do	19	55	n.	Do	9	82	se.
Do	20	60	ne.	Do	16	60	nw.
Do	28	60	nw.	Do	18	50	w.
Nantucket, Mass	26	51	e.	Do	27	51	nw.
Neah Bay, Wash	6	56	ne.	Do	28	75	nw.
New York, N. Y	22	60	nw.	Do	29	63	nw.
Do	23	56	nw.	Williston, N. Dak	25	50	nw.

SUNSHINE AND CLOUDINESS.

The distribution of sunshine is graphically shown on Chart VII, and the numerical values of average daylight cloudiness, both for individual stations and by geographical districts, appear in Table I.

The averages for the various districts, with departures from the normal, are shown in the table below:

Average cloudiness and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
New England	6.5	+0.9	Missouri Valley	5.9	+1.0
Middle Atlantic	6.0	+0.8	Northern Slope	5.2	+0.6
South Atlantic	5.4	+0.9	Middle Slope	5.8	+2.2
Florida Peninsula	5.1	+0.5	Southern Slope	5.6	+2.4
East Gulf	5.6	+1.1	Southern Plateau	3.2	+0.9
West Gulf	6.3	+1.7	Middle Plateau	4.9	+1.3
Ohio Valley and Tennessee	6.5	+0.8	Northern Plateau	6.6	+0.6
Lower Lake	6.7	−0.5	North Pacific	8.4	+1.6
Upper Lake	7.6	+0.6	Middle Pacific	5.3	+1.5
North Dakota	6.0	+0.7	South Pacific	3.5	+0.6
Upper Mississippi Valley	6.8	+1.5			

ATMOSPHERIC ELECTRICITY.

Numerical statistics relative to auroras and thunderstorms are given in Table IV, which shows the number of stations from which meteorological reports were received, and the number of such stations reporting thunderstorms (T) and auroras (A) in each State and on each day of the month, respectively.

Thunderstorms.—Reports of 481 thunderstorms were received during the current month as against 353 in 1901 and 1,800 during the preceding month.

The dates on which the number of reports of thunderstorms for the whole country was most numerous were: 2d, 52; 1st, 48; 16th, 43.

Reports were most numerous from: Texas, 103; Indiana, 27; Illinois, 26.

Auroras.—The evenings on which bright moonlight must have interfered with observations of faint auroras are assumed to be the four preceding and following the date of full moon, viz: 15th to 19th.

In Canada: No thunderstorms were reported. Auroras were reported at Grand Manan, Quebec, Minnedosa, Qu'Appelle, and Swift Current on the 23d, at Battleford on the 24th, and at Port Arthur on the 25th.

HUMIDITY.

The averages by districts appear in the subjoined table:

Average relative humidity and departures from the normal.

Districts.	Average.	Departure from the normal.	Districts.	Average.	Departure from the normal.
	%			%	
New England	81	+ 3	Missouri Valley	76	+ 5
Middle Atlantic	80	+ 4	Northern Slope	72	+ 6
South Atlantic	83	+ 4	Middle Slope	74	+12
Florida Peninsula	81	0	Southern Slope	78	+17
East Gulf	79	+ 2	Southern Plateau	50	+ 4
West Gulf	82	+ 9	Middle Plateau	62	+ 8
Ohio Valley and Tennessee	78	+ 5	Northern Plateau	75	+ 2
Lower Lake	77	+ 1	North Pacific	88	+ 1
Upper Lake	80	0	Middle Pacific	79	+ 6
North Dakota	77	— 2	South Pacific	72	+ 5
Upper Mississippi Valley	80	+ 6			

DESCRIPTION OF TABLES AND CHARTS.

By W. B. STOCKMAN, Forecast Official, in charge of Divison of Records and Meteorological Data.

For description of tables and charts see page 491 of REVIEW for October, 1902.

TABLE 1.—*Climatological data for Weather Bureau Stations, November, 1902.*

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.	Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.				
New England.							44.0	+ 4.3									81	1.29	— 2.9								6.5		
Eastport	76	69	74	29.96	30.05	+ .04	39.5	+ 2.8	55	7	46	24	11	34	24	37	34	82	1.47	— 2.8	10	8,204	sw.	42	ne.	26	5	11	14	7.0	0.5
Portland, Me	103	81	117	29.94	30.07	+ .03	40.5	+ 2.5	58	10	48	26	29	34	26	37	34	81	0.86	— 3.2	8	6,498	n.	34	ne.	13	8	6	16	6.8	0.8
Concord	298	70	79	29.75	30.09	+ .03	41.0	.....	66	14	51	22	29	31	38	.....	.....	.....	0.97	.....	9	3,317	nw.	24	nw.	22	7	12	11	5.8	0.2
Northfield	876	16	60	29.11	30.08	+ .03	37.8	+ 4.9	66	3	48	6	29	28	36	34	30	81	1.06	— 2.1	10	5,853	s.	34	nw.	28	4	10	16	7.1	2.6
Boston	125	115	181	29.93	30.07	+ .02	46.2	+ 5.6	70	15	54	28	29	38	34	42	39	80	1.09	— 3.5	4	7,792	sw.	44	ne.	26	9	5	16	6.5	T.
Nantucket	12	43	85	30.05	30.07	+ .02	48.9	+ 4.2	62	15	53	31	29	44	17	46	44	85	1.96	— 1.6	11	11,218	n.	51	e.	26	3	9	18	7.3	
Block Island	31	11	60	30.06	30.09	+ .03	48.6	+ 3.7	63	10	54	30	29	43	21	46	42	81	1.77	— 2.4	10	13,877	sw.	60	e.	26	8	12	10	5.7	T.
New Haven	106	117	140	29.96	30.08	+ .01	46.7	+ 5.6	67	15	55	26	29	38	30	42	39	79	0.79	— 3.2	9	6,756	n.	34	n.	26	10	8	12	5.8	T.
Mid. Atlantic States.							51.0	+ 6.3									80	2.54	— 0.5								6.0		
Albany	97	102	115	29.98	30.10	+ .02	43.4	+ 4.2	65	15	52	22	29	35	29	39	36	81	0.95	— 2.0	7	5,171	s.	28	se.	6	8	7	15	6.7	1.8
Binghamton	875	79	90	29.13	30.07	— .02	44.2	+ 6.2	72	14	53	18	29	35	34	.....	.....	.....	1.07	— 1.3	10	4,246	ne.	26	nw.	23	5	10	15	7.0	4.0
New York	314	108	350	29.74	30.09	.00	50.0	+ 6.6	68	15	56	32	29	44	22	46	42	76	1.19	— 2.6	8	9,481	sw.	60	nw.	28	7	8	15	6.4	
Harrisburg	374	94	104	29.70	30.11	.00	48.8	+ 6.4	72	13	56	29	29	41	28	44	40	76	1.49	— 1.3	9	4,053	e.	33	nw.	28	4	12	14	6.7	1.0
Philadelphia	117	168	184	29.97	30.11	+ .01	50.9	+ 7.0	74	13	58	32	29	44	26	47	44	81	2.04	— 1.2	9	7,485	sw.	32	nw.	22	8	9	13	6.0	
Scranton	805	111	119	29.22	30.10	+ .01	45.6	.....	72	13	55	23	29	36	31	41	37	78	1.06	.....	7	4,737	sw.	32	nw.	23	4	11	15	7.0	2.4
Atlantic City	52	39	48	30.03	30.09	— .01	51.6	+ 6.9	73	13	58	29	29	46	29	49	47	86	3.42	— 0.1	10	6,528	sw.	29	se.	26	7	14	9	5.4	
Cape May	17	47	51	30.09	30.11	+ .01	52.0	+ 5.4	70	13	57	31	29	47	21	49	.....	.....	3.24	— 0.1	7	6,140	n.	30	nw.	23	7	15	8	5.6	
Baltimore	123	69	117	29.95	30.09	— .02	51.9	+ 6.5	76	13	59	32	29	44	28	47	43	76	3.71	+ 0.7	9	4,781	n.	32	w.	28	8	9	13	5.9	
Washington	112	59	76	29.98	30.10	— .02	51.3	+ 6.8	76	13	60	28	29	42	33	46	42	78	3.46	+ 0.6	10	4,313	s.	32	nw.	28	13	4	13	5.6	
Cape Henry	.....	5	58	30.06	30.09	— .01	56.9	+ 5.0	75	14	63	38	28	51	25	.....	.....	.....	2.25	.....	8	9,848	n.	51	nw.	23	11	9	10	5.7	
Lynchburg	681	83	88	29.34	30.09	— .04	53.7	+ 7.4	78	12	64	28	29	43	39	47	44	81	4.32	+ 1.4	6	2,297	sw.	21	nw.	28	13	6	11	5.1	
Norfolk	91	102	111	30.00	30.11	.00	57.4	+ 7.1	80	13	65	37	28	50	27	53	50	84	3.05	0.0	10	6,233	s.	28	n.	23	10	9	11	5.8	
Richmond	144	82	90	29.96	30.11	— .01	54.8	.....	79	16	64	32	29	45	34	.....	.....	.....	4.83	.....	6	3,304	n.	21	nw.	28	11	5	14	5.4	
S. Atlantic States.							60.8	+ 5.8									83	4.20	+ 1.3								5.4		
Asheville	2,253	73	100	27.76	30.11	— .03	51.9	.....	74	12	63	28	28	41	39	46	43	81	1.90	.....	5	5,217	se.	39	n.	28	14	4	12	5.1	T.
Charlotte	773	68	76	29.26	30.11	— .02	57.7	+ 7.8	78	16	66	30	28	49	27	51	48	78	4.44	+ 1.4	7	4,200	ne.	28	sw.	26	12	7	11	5.0	T.
Hatteras	11	12	47	30.07	30.09	— .02	60.6	+ 5.0	75	12	65	42	28	56	20	58	56	89	6.13	+ 1.0	12	9,981	ne.	48	w.	27	10	5	15	5.8	
Raleigh	376	93	101	29.69	30.10	— .03	56.5	+ 6.9	78	13	66	31	28	47	35	50	47	78	4.12	+ 1.9	9	3,930	sw.	22	n.	30	10	5	15	5.8	
Wilmington	78	82	90	29.99	30.07	— .05	59.8	+ 5.2	79	13	68	33	28	51	30	55	53	84	3.83	+ 1.4	8	5,373	ne.	32	w.	27	9	11	10	5.2	
Charleston	48	14	92	30.04	30.09	— .03	63.2	+ 5.6	79	15	70	33	28	57	24	59	57	85	4.05	+ 1.0	9	7,136	n.	36	sw.	25	8	13	9	5.4	
Columbia	351	114	122	29.72	30.11	— .01	59.6	+ 4.8	80	13	69	30	28	50	31	53	50	77	3.31	+ 1.0	9	5,193	ne.	39	sw.	27	12	6	12	5.6	
Augusta	180	89	97	29.90	30.09	— .04	59.8	+ 6.4	79	16	70	31	28	50	34	54	51	83	2.75	— 0.3	7	3,579	nw.	30	w.	27	12	9	9	4.9	
Savannah	65	79	89	30.02	30.09	— .03	64.0	+ 6.2	79	15	72	34	28	56	25	58	56	84	4.96	+ 2.7	8	4,760	ne.	32	w.	27	11	13	6	5.0	
Jacksonville	43	101	129	30.00	30.05	— .05	65.9	+ 4.5	81	5	73	36	28	59	22	62	60	88	4.18	+ 1.7	12	6,638	n.	40	sw.	25	5	13	12	6.3	
Florida Peninsula.							73.4	+ 2.3									81	2.75	+ 0.4								5.1		
Jupiter	28	10	30	29.99	30.02	— .03	74.3	+ 2.5	84	26	80	49	28	69	21	69	66	78	2.38	— 0.5	14	7,916	e.	36	ne.	1	6	19	5	5.6	
Key West	22	43	50	29.97	29.99	— .03	76.1	+ 1.9	86	18	80	62	28	72	11	71	68	80	4.90	+ 2.6	7	8,045	ne.	32	nw.	27	11	14	5	4.9	
Tampa	34	60	67	30.00	30.04	— .04	69.9	+ 2.5	85	20	78	42	28	62	23	64	62	84	0.97	— 0.8	4	4,978	ne.	27	s.	25	10	16	4	4.9	
East Gulf States.							61.6	+ 5.4									79	3.49	— 0.3								5.6		
Atlanta	1,174	190	216	28.84	30.09	— .04	57.8	+ 6.0	76	16	65	27	28	50	24	52	48	77	3.59	0.0	5	8,037	se.	40	nw.	26	6	10	14	5.9	
Macon	370	93	99	29.69	30.09	— .04	59.0	.....	78	16	69	30	28	49	33	.....	.....	.....	3.31	.....	7	3,863	n.	26	w.	26	8	6	16	6.3	
Pensacola	56	79	96	30.09	30.06	— .05	64.2	+ 5.0	77	15	71	41	28	57	29	.....	.....	.....	2.91	— 0.9	5	6,791	ne.	42	sw.	25	12	11	7	4.6	
Mobile	57	88	96	30.00	30.06	— .05	62.7	+ 4.8	81	15	71	39	28	54	24	57	54	79	2.53	— 1.3	5	4,334	n.	24	sc.	4	12	8	10	4.9	
Montgomery	223	100	112	29.83	30.07	— .05	60.0	+ 4.8	80	16	69	30	28	51	28	54	50	78	3.69	+ 0.3	4	3,934	e.	27	w.	27	11	8	11	4.9	T.
Meridian	375	84	93	29.66	30.06	— .06	58.0	+ 4.6	81	15	68	28	28	48	30	.....	.....	.....	4.27	+ 1.2	8	3,516	e.	23	nw.	26	9	10	11	5.8	T.
Vicksburg	247	62	74	29.75	30.02	— .10	62.2	+ 6.8	82	15	70	34	28	54	25	55	51	76	3.80	— 1.0	8	5,191	e.	24	s.	24	8	10	12	6.1	
New Orleans	51	88	121	29.99	30.04	— .06	66.2	+ 5.5	84	14	73	40	27	59	18	60	58	83	3.65	— 0.5	4	5,586	se.	36	se.	4	6	13	11	6.2	
West Gulf States.							62.7	+ 6.2									82	5.86	+ 1.9								6.3		
Shreveport	249	77	84	29.77	30.04	— .07	61.3	+ 6.7	80	8	69	35	27	54	24	56	53	82	5.48	+ 0.7	13	5,117	se.	37	se.	4	6	11	13	6.5	
Fort Smith	457	79	94	29.53	30.02	— .09	55.8	+ 6.5	79	10	63	30	27	49	25	51	48	80	7.41	+ 3.7	12	6,486	e.	40	nw.	26	1	16	13	7.2	
Little Rock	357	93	100	29.67	30.06	— .06	57.8	+ 7.0	78	10	64	33	27	51	23	52	49	77	7.03	+ 1.8	13	4,644	se.	29	nw.	27	8	12	10	6.4	
Corpus Christi	20	48	53	29.96	29.98	— .09	69.4	+ 6.4	84	8	75	41	27	64	25	65	63	84	3.91	+ 0.9	7	7,594	se.	36	n.	16	9	12	9	5.4	
Fort Worth	670	106	114	29.28	29.99	— .11	58.5	.....	79	1	66	33	27	51	22	.....	.....	.....	6.89	.....	11	7,692	se.	36	nw.	26	5	11	14	6.6	
Galveston	54	106	112	29.93	29.99	— .10	68.0	+ 5.6	79	16	72	45	27	64	16	64	62	85	6.59	+ 2.2	12	9,134	se.	40	nw.	26	9	11	10	5.6	
Palestine	510	73	79	29.49	30.02	— .09	61.7	+ 5.5	80	8	68	36	27	55	26	57	55	85	7.08	+ 2.6	14	5,428	se.	27	nw.	26	2	13	15	7.3	
San Antonio	701	80	91	29.26	29.98	— .10	64.8	+ 5.8	84	8	73	36	27	56	30	59	55	78	3.53	+ 1.5	14	5,493	se.	30	nw.	26	9	6	15	6.0	
Taylor	583	55	63	29.38	30.00	— .08	62.4	.....	81	9	71	34	27	54	28	.....	.....	.....	6.29	.....	16	6,118	se.	29	se.	12	7	11	12	5.8	
Ohio Val. and Tenn.							53.1	+ 2.0									78	3.25	— 0.4								6.3		
Chattanooga	762	106	112	29.29	30.11	— .03	55.7	+ 5.8	77	16	65	30	28	46	32	49	45	76	3.90	+ 0.1	10	3,827	s.	34	sw.	25	6	12	12	6.0	0.3
Knoxville	1,004	10	88	29.03	30.10	— .03	54.0	+ 7.4	77	16	64	29	28	44	33	48	46	85	4.03	+ 0.2	11	3,786	sw.	34	sw.	25	7	10	13	6.4	0.2
Memphis	337	140	154	29.65	30.08	— .04	58.0	+ 8.1	79	10	65	31	27	51	22	53	50	80	4.15	— 0.5	11	6,454	se.	31	nw.	26	6	10	14	6.3	T.
Nashville	546	122	131	29.51	30.10	— .02	55.0	+ 7.0	78	10	64	30	27	46	33	49	45	76	4.04	+ 0.2	10	4,066	s.	27	s.	13	10	8	12	5.4	T.
Lexington	989	75	102	29.02	30.10	— .02	52.6	+ 9.0	75	11	60	28	30	45	28	.....	.....	.....	3.09	— 0.6	12	7,179	s.	32	s.	14	4	14	12	6.5	0.7
Louisville	525	114	136	29.50	30.09	— .03	54.0	+ 8.7	79	14	61	32	30	46	31	48	44	76	3.85	— 0.2	11	5,301	s.	25	s.	14	9	8	13	5.9	T.
Evansville	431	72	82	29.58	30.06	— .06	53.4	.....	78	10	60	30	27	47	26	.....	.....	.....	4.63	.....	10	4,970	s.	30	s.	14	6	10	14	6.2	2.2
Indianapolis	822	154	164	29.16	30.05	— .05	50.2	+ 9.3	74	11	57	26	28	44	23	45	42	80	3.03	— 0.8	14	7,484	s.	38	s.	14	6	10	14	6.3	4.7
Cincinnati	628	152	157	29.40	30.08	— .04	52.4	+ 8.5	76	11	60	30	30	45	28	47	43	75	3.29	0.0	14	4,560	se.	26	sw.	29	6	11	13	6.5	T.
Columbus	824	87	100	29.19	30.07	— .04	49.8	+ 8.6	72	11	57	28	30	42	27	45	41	79	2.72	— 0.6	12	7,829	sw.	36	nw.	22	6	8	16	6.9	T.
Pittsburg	842	116	123	29.17	30.09	— .01	51.2	+ 8.4	73	2	59	24	30	43	31	46	42	74	1.08	— 1.4	12	3,890	nw.	20	sw.	5	5	8	17	7.2	2.1
Parkersburg	638	77	84	29.42	30.11	— .01	51.6	+ 7.6	75	11	61	29	30	43	38	46	42	77	2.61	— 0.4	10	3,537	se.	32	nw.	22	3	7	20	7.7	T.
Elkins	1,940	41	50	28.03	30.10	— .02	46.8	.....	74	2	59	17	29	35	45	42	39	83	3.92	.....	14	2,414	n.	25	s.	5	2	13	15	7.1	1.7
Lower Lake Region.							47.5	+ 3.4									77	1.53	— 1.6								6.7		
Buffalo	767	178	206	29.20	30.04	— .01	47.8	+ 9.6	67	14	54	25	29	42	26	43	38	72	1.03	— 2.5	12	12,160	w.	66	sw.	29	1	8	21	7.9	2.9
Oswego	335	76	91	29.67	30.05	.00	44.3	+ 5.8	64	12	52	23	29	37	26	41	38	79	1.78	— 1.6	11	7,923	s.	32	nw.	22	5	6	19	7.1	3.6
Rochester	523	81	90	29.47	30.05	.00	46.0	+ 8.6	72	2	54	23	29	38	29	42	38	78	1.01	— 1.8	10	6,181	sw.	32	sw.	12	4	8	18	7.3	4.1
Syracuse	397	97	113	29.40	30.05	— .01	45.4	.....	71	13	53	21	29	38	27	.....	.....	.....	1.63	.....	13	8,656	s.	48	nw.	22	5	9	16	6.7	4.9
Erie	713	92	102	29.26	30.04	— .02	49.0	+ 8.0	72	2	56	28	30	43	30	44	40	76	1.34	— 2.8	9	9,202	sw.	40	s.	29	7	10	13	6.4	1.5
Cleveland	762	190	201	29.22	30.05	— .02	48.8	+ 9.1	72	2	55	28	30	42	27	44	41	79	2.07	— 0.8	10	11,216	s.	48	nw.	22	6	8	16	6.8	0.8
Sandusky	629	62	70	29.36	30.05	— .03	49.4	+ 9.0	72	2	56	28	27	43	26	.....	.....	.....	2.02	— 1.0	13	6,372	sw.	34	nw.	22	12	5	13	5.4	T.
Toledo	628	123	127	29.36	30.05	— .02	47.6	+ 8.4	72	2	54	25	28	41	24	43	39	77	1.40	— 1.5	10	7,502	sw.	35	sw.	29	11	5	14	6.1	2.2
Detroit	730	153	193	29.23	30.03	— .03	46.9	+ 8.8	69	12	53	22	28	41	21	42	39	79	1.57	— 1.1	10	8,950	sw.	40	sw.	29	7	8	15	6.8	5.1
Upper Lake Region.							41.4	+ 3.0									80	2.41	0.0								7.0		
Alpena	609	63	80	29.32	29.99	— .02	42.2	+ 9.4	67	13	49	17	28	35	28	38	35	80	2.86	0.0	9	8,476	nw.	37	nw.	22	3	7	20	8.1	0.1
Escanaba	612	43	57	29.30	29.98	— .05	38.4	+ 7.2	55	4	44	16	30	33	21	36	32	79	2.66	+ 0.4	9	7,594	s.	34	n.	27	4	8	18	7.5	T.
Grand Haven	632	54	92	29.31	29.99	— .05	45.4	+ 8.3	65	14	51	27	25	40	28	42	39	82	2.76	— 0.2	14	10,414	s.	42	sw.	23	2	10	18	7.4	2.0
Houghton	668	66	74	29.22	29.96	— .06	36.3	.....	62	1	41	16	30	31	20	.....	.....	.....	3.18	.....	14	4,921	nw.	34	ne.	2	2	5	23	8.4	3.5
Marquette	734	79	116	29.16	29.98	— .04	37.8	+ 6.4	58	4	43	14	30	33	19	34	29	73	3.39	+ 0.7	12	7,985	nw.	35	sw.	3	2	6	22	8.4	1.2
Port Huron	638	70	129	29.34	30.05	.00	45.4	+ 9.0	68	12	52	19	28	38	23	41	39	82	1.75	— 1.1	12	8,918	sw.	38	w.	29	8	8	14	6.3	7.0
Sault Ste. Marie	614	40	61	29.28	29.95	— .06	37.8	+ 7.5	58	2	43	15	28	33	18	35	30	77	3.54	+ 1.0	16	7,347	se.	47	nw.	22	3	5	22	8.4	6.2
Chicago	823	241	274	29.13	30.03	— .04	47.0	+ 8.6	70	12	53	26	30	41	22	43	40	79	2.03	— 0.7	11	13,583	sw.	52	sw.	23	8	13	9	6.1	0.5
Milwaukee	681	124	142	29.27	30.02	— .03	44.9	+ 9.7	70	12	52	24	30	38	24	41	38	83	1.85	— 0.2	7	8,504	sw.	39	sw.	14	7	4	19	7.0	1.2
Green Bay	617	49	57	29.31	29.98	— .06	41.2	+ 9.1	64	2	48	20	30	34	27	37	33	77	1.42	— 0.6	8	8,550	sw.	40	ne.	26	3	9	18	7.9	0.1
Duluth	702	95	116	29.19	29.98	— .06	34.1	+ 4.7	58	1	39	7	30	29	22	32	29	84	1.85	+ 0.2	9	7,465	sw.	43	nw.	2	2	9	19	7.9	4.1
North Dakota.							33.4	+ 3.0									77	0.42	— 0.3								6.0		
Moorhead	935	54	60	28.97	30.00	— .07	29.8	+ 5.6	58	2	36	8	30	23	23	28	26	89	0.54	— 0.4	6	7,313	nw.	40	se.	17	11	4	15	6.4	3.0
Bismarck	1,674	16	29	28.16	30.00	— .07	29.7	+ 3.8	61	3	39	7	26	20	34	24	19	68	T.	— 0.7	0	6,198	nw.	44	nw.	25	11	8	11	5.5	T.
Williston	1,873	14	34	27.90	29.93	— .13	25.6	— 0.5	56	2	35	3	29	16	37	22	17	73	0.72	+ 0.2	11	6,368	s.	50	nw.	25	9	5	16	6.2	8.4

TABLE I.—*Climatological data for Weather Bureau Stations, November, 1902*—Continued.

Stations.	Elevation of instruments.			Pressure, in inches.			Temperature of the air, in degrees Fahrenheit.										Mean wet thermometer.	Mean temperature of the dew-point.	Mean relative humidity, per cent.	Precipitation, in inches.			Wind.					Clear days.	Partly cloudy days.	Cloudy days.	Average cloudiness, tenths.	Total snowfall.
	Barometer above sea level, feet.	Thermometers above ground.	Anemometer above ground.	Actual, reduced to mean of 24 hours.	Sea level, reduced to mean of 24 hrs.	Departure from normal.	Mean max. + mean min. ÷ 2.	Departure from normal.	Maximum.	Date.	Mean maximum.	Minimum.	Date.	Mean minimum.	Greatest daily range.				Total.	Departure from normal.	Days with .01, or more.	Total movement, miles.	Prevailing direction.	Maximum velocity. Miles per hour.	Maximum velocity. Direction.	Maximum velocity. Date.					
Upper Miss. Valley.							**45.7**	**+ 8.3**											**80**	**2.27**	**+ 0.1**								**6.8**	
Minneapolis	.....	99	208	.....	.....	.....	36.0	+ 6.3	62	1	42	17	29	31	24	.....	.....	.....	.....	1.74	+ 1.1	9	8,691	nw.	42	sw.	3	4	5	21	.....	2.4
St. Paul	837	102	122	29.05	29.98	— .08	37.3	+ 7.4	63	1	42	18	30	32	20	33	30	78	2.40	+ 1.3	8	5,695	nw.	31	nw.	2	5	6	19	7.6	1.8
La Crosse	714	71	87	29.22	30.00	— .07	41.0	+ 7.6	67	13	48	19	30	34	28	.....	.....	.....	1.76	+ 0.3	7	5,834	s.	25	se.	28	2	9	19	7.6	1.0
Davenport	606	71	79	29.34	29.98	— .10	46.5	+ 9.7	72	11	54	25	30	39	32	43	40	83	1.95	— 0.1	8	5,395	s.	30	sw.	14	8	9	13	6.0	0.5
Des Moines	861	84	88	29.08	30.02	— .06	43.2	+ 6.8	72	1	51	24	27	35	28	40	37	85	1.65	— 0.1	9	6,604	sw.	36	sw.	11	6	10	14	6.8	T.
Dubuque	698	100	117	29.24	30.00	— .07	44.0	+ 9.0	69	12	51	22	30	37	28	40	37	79	0.86	— 1.2	7	5,205	s.	30	s.	14	5	7	18	7.3	1.1
Keokuk	614	63	78	29.34	30.01	— .08	48.2	+ 9.4	76	11	56	27	26	41	28	44	41	82	2.60	+ 0.5	11	5,902	sw.	34	sw.	14	7	9	14	6.4	0.9
Cairo	356	87	93	29.68	30.08	— .04	54.6	+ 8.4	80	10	61	29	27	48	22	49	46	79	3.51	— 0.7	10	5,323	s.	27	nw.	26	2	12	16	7.5	T.
Springfield, Ill.	644	82	93	29.34	30.04	— .06	49.0	+ 8.1	76	11	56	26	28	42	26	45	42	81	2.82	— 0.2	10	6,953	sw.	30	w.	14	5	14	11	6.3	T.
Hannibal	534	75	110	29.42	30.00	— .09	49.4	+ 9.2	78	11	58	27	26	41	30	.....	.....	.....	2.53	+ 0.4	9	6,922	sw.	37	w.	29	5	12	13	6.6	1.4
St. Louis	567	111	210	29.42	30.04	— .06	53.3	+ 9.7	79	10	60	29	27	47	25	48	44	76	3.20	+ 0.1	13	6,816	s.	45	sw.	29	8	8	14	6.4	0.3
Missouri Valley.							**42.1**	**+ 5.2**											**76**	**1.46**	**+ 0.2**								**5.9**	
Columbia	784	11	84	29.18	30.02	— .07	50.6	+ 7.6	79	11	59	25	26	42	31	.....	.....	.....	2.89	+ 0.6	9	6,214	s.	34	sw.	29	5	10	15	6.9	T.
Kansas City	963	78	95	28.99	30.04	— .05	49.0	+ 8.3	75	1	57	24	27	41	24	45	42	82	2.04	— 0.1	8	6,238	s.	28	s.	11	6	8	16	6.8	T.
Springfield, Mo	1,324	98	104	28.61	30.02	— .08	51.1	+ 7.6	78	10	58	28	27	44	22	48	45	86	4.20	+ 1.1	12	8,091	se.	36	se.	28	8	3	19	6.9	T.
Topeka	.....	81	89	.....	.....	.....	47.1	+ 5.9	74	9	56	20	27	38	28	.....	.....	.....	2.13	+ 1.0	10	6,685	s.	34	s.	11	3	12	15	6.7	T.
Lincoln	1,189	75	84	28.71	30.00	— .08	41.7	+ 3.6	73	11	50	17	27	33	36	37	34	80	1.97	+ 1.3	11	7,976	s.	37	nw.	26	11	9	10	5.2	0.8
Omaha	1,105	115	121	28.80	30.02	— .06	41.4	+ 4.8	72	1	49	17	27	34	33	37	34	80	1.38	+ 0.3	8	6,892	n.	31	sw.	23	7	10	13	6.4	0.8
Valentine	2,598	47	54	27.19	29.96	— .12	37.2	+ 2.9	73	3	50	6	29	25	42	30	23	68	0.53	+ 0.1	6	7,849	nw.	41	nw.	25	16	7	7	3.5	2.4
Sioux City	1,135	96	164	28.76	30.00	— .08	37.5	+ 3.2	62	23	46	10	27	30	33	.....	.....	.....	0.16	— 0.7	7	8,890	nw.	42	s.	7	8	7	15	6.2	0.8
Pierre	1,572	43	50	28.28	29.98	— .10	36.0	+ 4.1	64	3	46	12	10	26	37	29	22	65	0.17	— 0.3	2	5,009	e.	30	nw.	3	12	7	11	5.2	1.2
Huron	1,306	56	67	28.57	30.00	— .08	33.6	+ 4.1	64	3	44	6	27	23	38	28	23	70	0.29	— 0.3	4	8,001	nw.	40	se.	27	12	6	12	5.6	0.3
Yankton	1,233	42	49	28.64	29.99	— .09	38.0	+ 5.2	67	23	48	11	27	29	37	.....	.....	.....	0.28	— 0.4	4	5,544	nw.	33	s.	3	9	8	13	6.0	T
Northern Slope.							**33.6**	**+ 0.9**											**72**	**0.38**	**— 0.1**								**5.2**	
Havre	2,505	46	53	27.24	29.94	— .09	26.6	— 3.3	57	2	35	3	12	18	38	24	22	84	0.99	+ 0.4	5	8,247	sw.	47	sw.	17	8	9	13	6.0	9.8
Miles City	2,371	42	50	27.38	29.94	— .13	33.6	+ 2.3	62	7	43	8	29	24	32	29	26	85	0.10	— 0.3	3	4,220	s.	60	n.	9	13	11	6	4.5	1.0
Helena	4,110	88	94	25.70	29.99	— .11	31.0	— 0.5	54	2	39	11	23	23	33	26	20	67	0.59	— 0.1	8	5,789	sw.	48	sw.	3	6	13	11	6.3	2.6
Kalispell	2,965	45	51	26.82	29.94	— .13	32.4	.....	48	2	38	11	28	27	21	30	27	83	2.95	.....	15	3,381	w.	25	sw.	27	3	9	18	7.8	11.2
Rapid City	3,234	46	50	26.52	29.96	— .12	35.8	+ 0.9	66	23	47	13	10	24	37	29	23	68	0.68	+ 0.3	3	5,273	nw.	42	nw.	25	18	6	6	3.3	5.0
Cheyenne	6,088	56	64	23.92	30.00	— .07	35.8	+ 1.6	67	9	48	9	29	24	35	27	18	54	0.23	— 0.1	4	7,204	w.	39	w.	3	12	10	8	5.1	2.1
Lander	5,372	26	36	24.55	30.00	— .10	32.8	+ 1.2	65	8	46	6	29	19	37	26	20	63	0.06	— 0.6	1	3,003	sw.	30	sw.	3	12	16	2	3.7	0.6
North Platte	2,821	43	52	27.04	30.02	— .06	39.3	+ 4.1	75	8	51	13	29	28	42	32	28	73	T.	— 0.4	0	5,512	nw.	36	nw.	25	9	17	4	5.1	T.
Middle Slope.							**45.1**	**+ 3.8**											**74**	**1.95**	**+ 1.0**								**5.8**	
Denver	5,291	79	151	24.65	29.98	— .08	41.2	+ 3.2	74	9	53	13	29	29	37	32	22	54	0.61	0.0	3	5,175	s.	45	nw.	25	11	13	6	4.7	4.0
Pueblo	4,685	80	86	25.22	29.96	— .09	40.5	+ 1.7	75	9	54	8	30	26	45	32	22	53	0.39	+ 0.1	•3	4,304	nw.	36	nw.	3	8	17	5	5.2	T.
Concordia	1,398	42	47	28.52	30.02	— .06	44.2	+ 4.2	75	1	53	19	27	35	29	39	37	84	1.14	+ 0.3	8	5,446	s.	30	s.	11	9	6	15	5.8	0.6
Dodge	2,509	44	54	27.36	30.00	— .07	43.7	+ 3.5	79	1	55	15	29	32	37	38	34	79	0.53	0.0	6	8,332	s.	40	s.	11	9	12	9	5.3	
Wichita	1,358	78	85	28.57	30.02	— .06	47.9	+ 5.1	76	1	55	23	27	41	28	44	42	85	1.76	+ 0.8	11	6,635	s.	35	sw.	11	7	7	16	6.6	T.
Oklahoma	1,214	79	86	28.71	30.00	— .08	53.0	+ 5.1	75	9	60	28	27	46	24	49	48	90	7.25	+ 4.8	9	8,434	s.	40	n.	2	5	8	17	7.2	
Southern Slope.							**52.5**	**+ 4.2**											**78**	**2.35**	**+ 1.3**								**5.6**	
Abilene	1,738	45	54	28.17	29.98	— .09	58.0	+ 6.0	79	9	67	33	27	50	28	52	49	80	2.46	+ 1.1	6	6,794	se.	32	se.	11	8	8	14	6.3	
Amarillo	3,676	43	52	26.21	29.96	— .09	47.0	+ 2.5	78	9	58	24	29	36	41	40	35	75	2.24	+ 1.5	7	9,575	s.	42	nw.	25	16	5	9	4.9	2.0
Southern Plateau.							**48.3**	**— 1.0**											**50**	**0.88**	**+ 0.4**								**3.2**	
El Paso	3,762	10	110	26.14	29.92	— .08	53.9	+ 2.4	81	10	68	24	27	40	44	42	30	48	0.49	0.0	4	7,144	nw.	46	ne.	30	15	12	3	3.4	T.
Santa Fe	7,013	47	50	23.20	30.00	— .03	39.6	+ 2.0	61	10	48	14	26	31	26	30	21	55	0.93	+ 0.2	4	4,869	se.	34	se.	20	16	13	1	3.1	T.
Flagstaff	6,907	12	25	23.28	29.93	— .09	33.0	— 5.6	62	3	45	— 7	24	21	41	28	.....	.....	6.75	.....	8	.....	sw.	.....	.....	.....	15	7	8	3.9	42.6
Phoenix	1,108	50	56	28.78	29.93	— .05	58.0	+ 0.1	84	2	71	34	26	45	35	47	37	56	2.01	+ 1.5	5	2,738	e.	17	w.	11	19	9	2	2.9	
Yuma	141	16	50	29.78	29.94	— .04	60.0	— 2.3	84	•	72	34	24	48	36	49	38	50	0.57	+ 0.3	5	4,247	n.	30	n.	30	23	3	4	1.7	
Independence	3,910	51	58	25.97	29.98	— .07	45.4	— 2.4	68	4	56	27	24	34	31	38	21	43	0.41	+ 0.2	4	5,478	nw.	31	s.	10	15	7	8	4.3	3.6
Middle Plateau.							**39.2**	**— 0.2**											**62**	**0.92**	**— 0.1**								**4.9**	
Carson City	4,720	82	92	25.25	30.03	— .08	38.9	— 2.5	64	8	50	17	28	28	41	33	27	67	0.76	— 0.7	7	5,051	sw.	60	sw.	18	9	12	9	5.0	1.8
Winnemucca	4,344	59	70	25.59	30.03	— .11	37.2	+ 0.1	67	8	48	12	28	26	44	32	26	67	0.57	0.0	6	6,917	sw.	48	s.	18	14	8	8	4.7	1.1
Modena	5,479	10	38	24.58	30.01	— .07	34.6	.....	64	9	46	3	26	23	45	28	20	64	0.89	.....	6	6,289	w.	40	s.	19	15	8	7	4.0	6.8
Salt Lake City	4,366	105	110	25.60	30.02	— .10	41.0	+ 1.2	70	9	49	21	30	33	25	34	26	56	1.24	— 0.1	8	4,316	se.	40	nw.	24	9	4	17	6.1	4.1
Grand Junction	4,608	43	51	25.36	30.04	— .04	39.8	+ 0.4	68	10	50	18	30	29	38	32	23	55	1.10	+ 0.5	7	3,138	nw.	24	nw.	25	9	15	6	4.8	1.5
Northern Plateau.							**33.4**	**+ 0.8**											**75**	**2.53**	**+ 1.1**								**6.6**	
Baker City	3,471	53	58	26.39	30.03	— .13	36.5	— 0.3	57	9	43	21	25	30	24	32	27	71	1.73	+ 0.8	18	4,525	se.	29	se.	17	7	1	22	5.8	5.8
Boise	2,739	61	68	27.16	30.06	— .11	41.0	+ 2.5	70	10	49	25	25	33	27	36	30	69	1.93	+ 0.6	15	3,650	se.	24	e.	16	9	4	17	6.5	1.8
Lewiston	757	52	61	29.17	29.99	— .16	42.8	+ 0.5	58	1	49	28	20	37	22	.....	.....	.....	1.90	+ 0.1	15	2,727	e.	26	w.	24	6	8	16	7.1	
Pocatello	4,482	46	54	25.45	30.05	— .09	36.0	+ 3.0	64	9	44	12	25	28	25	31	25	65	1.14	— 0.2	9	7,620	se.	36	se.	17	7	14	9	5.6	6.1
Spokane	1,943	101	110	27.90	29.99	— .11	36.8	— 1.0	50	1	42	20	29	32	14	35	32	85	4.12	+ 2.4	18	5,303	s.	36	s.	17	1	4	25	8.5	3.9
Walla Walla	1,000	65	73	28.91	29.99	— .14	43.2	+ 0.2	64	2	49	28	26	38	22	40	38	87	4.37	+ 3.0	18	4,845	s.	32	s.	17	6	11	13	6.1	
N. Pac. Coast Reg.							**45.6**	**+ 0.2**											**88**	**10.03**	**+ 3.5**								**8.4**	
Neah Bay †	50	7	50	29.71	29.75	— .22	44.9	— 1.5	55	15	49	35	19	41	17	44	43	91	12.47	.....	17	5,448	sw.	56	ne.	6	1	5	14	8.2	
North Head	211	11	56	29.69	29.93	— .12	47.7	— 0.5	58	9	52	36	20	44	15	47	46	93	8.85	+ 0.3	23	15,244	se.	73	se.	2	1	5	24	8.8	
Port Crescent	259	13	20	29.59	29.83	— .17	42.5	+ 0.2	53	•	48	29	5	37	23	.....	.....	.....	8.90	+ 2.5	22	2,777	sw.	24	sw.	1	1	9	20	8.1	
Seattle	123	114	151	29.81	29.94	— .10	45.8	+ 0.9	58	10	50	34	20	42	13	43	41	84	6.30	+ 0.6	21	6,403	se.	38	se.	30	0	10	20	8.3	
Tacoma	213	113	120	29.73	29.96	— .08	44.4	+ 0.2	58	10	49	30	5	40	16	.....	.....	.....	10.84	+ 4.7	23	5,181	sw.	30	sw.	30	0	1	29	9.4	
Astoria	20	57	64	.....	.....	.....	47.4	+ 0.5	57	7	52	34	20	42	16	.....	.....	.....	15.87	+ 6.3	23	.....	sw.	.....	.....	.....	4	5	21	7.3	
Portland, Oreg.	154	68	96	29.81	29.97	— .13	46.1	+ 0.5	62	10	51	31	23	41	17	44	42	87	9.94	+ 4.2	22	4,788	s.	34	sw.	30	0	8	22	8.7	
Roseburg	518	56	67	29.46	30.02	— .10	46.2	+ 1.0	64	7	52	33	20	41	17	44	41	85	9.49	+ 5.8	23	2,279	s.	17	sw.	16	2	4	24	8.7	
Mid. Pac. Coast Reg.							**52.6**	**— 1.0**											**79**	**4.88**	**+ 1.6**								**5.3**	
Eureka	62	62	80	29.99	30.05	— .06	51.8	+ 1.2	65	6	58	37	21	46	24	49	46	83	10.88	+ 5.5	18	4,835	se.	36	n.	20	7	8	15	6.1	
Mount Tamalpais	2,375	11	18	27.56	30.05	— .04	47.4	.....	62	2	52	37	19	43	15	43	39	79	3.82	.....	10	13,059	nw.	70	nw.	16	10	11	9	5.2	
Red Bluff	332	50	56	29.68	30.05	— .06	51.3	— 2.6	68	1	59	35	24	44	24	47	43	77	6.64	+ 3.5	10	4,639	se.	32	n.	19	12	6	12	5.0	
Sacramento	69	106	117	29.97	30.03	— .06	51.4	— 2.1	70	2	60	30	28	43	27	47	43	75	2.02	— 0.1	7	5,691	se.	40	se.	9	11	12	7	4.9	
San Francisco	155	161	167	29.91	30.07	— .02	54.8	— 1.5	67	1	60	45	27	50	15	51	48	81	1.98	— 0.7	8	5,789	w.	37	se.	9	13	9	8	4.7	
Point Reyes Light	490	7	30	29.49	30.01	.....	53.6	— 0.2	63	2	57	44	19	50	15	.....	.....	.....	2.88	— 0.2	11	14,792	nw.	82	se.	9	10	7	13	5.7	
S. Pac. Coast Reg.							**55.9**	**— 1.6**											**72**	**1.84**	**+ 0.5**								**3.5**	
Fresno	330	67	70	29.68	30.04	— .02	51.3	— 4.1	73	2	61	33	20	42	30	47	43	77	2.25	+ 1.1	3	2,679	nw.	14	nw.	16	13	11	6	4.4	
Los Angeles	338	116	123	29.62	29.99	— .03	58.2	— 1.0	86	2	69	39	21	48	31	50	44	69	2.08	+ 0.7	3	3,621	ne.	22	ne.	29	15	13	2	3.0	
San Diego	87	94	102	29.87	29.96	— .06	58.3	— 0.3	74	2	65	42	24	51	22	52	46	72	1.53	+ 0.8	6	4,098	nw.	24	e.	10	20	7	3	3.2	
San Luis Obispo	201	46	48	29.84	30.06	.00	55.8	— 1.2	82	2	65	32	21	46	39	49	43	69	1.52	— 0.5	5	4,124	n.	20	s.	9	17	10	3	3.4	
West Indies.																														
Basseterre	29	41	54	29.89	29.92	+ .02	79.0	.....	86	9	84	69	25	74	13	74	71	76	6.61	.....	18	6,530	e.	25	e.	16	5	17	8	5.7	
Bridgetown	30	57	65	29.86	29.89	+ .02	80.4	+ 3.2	88	5	86	72	8	75	15	75	73	78	5.78	— 0.4	17	5,942	e.	28	se.	15	13	5	12	5.5	
Cienfuegos	52	62	67	29.89	29.94	— .02	76.6	.....	89	15	84	62	10	69	21	71	69	85	2.51	.....	3	5,273	ne.	23	se.	1	17	11	2	3.6	
Grand Turk	11	6	20	29.92	29.93	— .02	78.6	.....	88	10	85	68	24	72	18	.....	.....	.....	3.89	.....	18	.....	e.	.....	.....	.....	9	15	6	5.0	
Havana	57	87	105	29.91	29.97	— .02	75.8	+ 0.5	86	17	82	64	12	70	19	70	68	82	3.96	+ 0.9	11	8,596	e.	38	ne.	1	12	14	4	4.6	
Kingston	286	38	52	29.59	29.88	.00	77.9	.....	90	16	86	66	27	70	21	71	69	80	1.63	.....	8	3,814	ne.	22	se.	14	11	13	6	4.9	
Port of Spain	40	65	66	29.84	29.88	+ .05	79.8	.....	90	6	88	69	8	72	20	.....	.....	.....	2.99	.....	13	.....	e.	.....	.....	.....	.....	.....	.....	.....	
Puerto Principe	352	55	62	29.59	29.95	+ .01	75.8	.....	88	30	84	62	27	67	24	71	70	90	1.12	.....	8	5,178	ne.	24	se.	12	16	8	6	4.4	
San Juan	82	48	90	29.84	29.92	+ .02	77.9	.....	87	1	83	69	23	72	15	73	71	82	5.65	— 0.8	20	5,780	e.	30	e.	16	7	17	6	5.2	
Santiago de Cuba	82	46	52	29.82	29.90	— .02	77.6	.....	89	6	86	64	26	69	23	71	69	83	2.06	.....	12	4,455	n.	23	ne.	2	10	13	7	5.3	
Santo Domingo	57	37	44	29.86	29.92	+ .03	76.8	.....	88	5	85	64	27	69	21	72	70	86	3.86	.....	15	4,113	n.	17	e.	19	7	20	3	5.1	
Willemstad	75	39	46	29.75	29.83	+ .02	81.5	.....	89	4	86	71	25	77	14	76	74	78	2.97	.....	11	7,695	e.	28	ne.	25	4	17	9	5.6	

NOTE.—The data at stations having no departures are not used in computing the district averages. • More than one date. † Station closed November 21, 1902, and instruments moved to Tatoosh Island, Wash.

TABLE II.—*Climatological record of voluntary and other cooperating observers, November, 1902.*

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Alabama.	°	°	°	*Ins.*	*Ins.*
Ashville	78	22	55.4	4.17	T.
Benton				4.82	
Bermuda	85	28	60.0	4.07	
Birmingham	80	29	59.6	4.46	
Bridgeport				5.56	
Burkeville				4.65	
Calera				3.44	
Camphill	80[c]	27[c]	57.2[c]	5.03	T.
Citronelle	81	32	62.4	3.47	
Clanton	76	26	55.4	5.53	1.3
Cordova	86[f]	23[f]	58.5[f]	2.55[f]	0.5
Daphne	85[h]	32[h]	61.6[h]	3.42	
Decatur	79[c]	29[c]	58.2[c]	5.71	
Demopolis				3.16	
Dothan	80	31	61.6	4.07	
Eufaula	79	28	58.0	1.95	
Eutaw	82	28	57.8	3.37	T.
Evergreen	81	29	60.0	3.70	
Flomaton	80	29	59.0	4.45	
Florence *a*				5.23	
Florence *b*	81	26	57.0	5.79	T.
Fort Deposit	80	28	58.6	4.06	
Gadsden	83	24	56.3	2.73	
Goodwater	81	23	56.5	4.46	T.
Greensboro	79	29	59.0	2.89	T.
Greenville				3.22	
Hamilton	79[c]	24[c]	54.9[c]	5.93	T.
Helena				4.25	
Highland Home	80	30	60.9	4.80	T.
Letohatchie				4.19	
Livingston *a*	80	28	57.0	3.40	
Lock No. 4	80	29	57.2	3.78	T.
Madison Station	80	24	58.2	6.10	
Maplegrove	81	22	54.3	4.71	
Marion	78	28	57.6	3.12	T.
Newbern	85	27	59.8	3.20	
Newburg	82	22	57.2	6.69	
Notasulga				5.71	
Oneonto	78	21	54.9	4.79	T.
Opelika	78	28	58.1	6.75	T.
Ozark	80	29	63.0	4.46	
Prattville	80	29	57.9	5.83	
Pushmataha	78	27	57.4	4.34	
Riverton	81	23	55.4	5.15	T.
Scottsboro	76	24	53.6	4.47	T.
Selma	83	29	59.7	4.50	
Talladega	84	23[d]	57.9	3.42	T.
Tallassee				3.31	
Thomasville	79	29	57.4	2.60	
Tuscaloosa	81	28	56.8	3.66	T.
Tuscumbia	79	26	54.4	3.79	
Tuskegee	84	28	61.7	4.51	T.
Union Springs	78	30	59.0	2.55	T.
Uniontown	82	26	58.8	3.31	0.1
Valleyhead	78	23	56.9	3.39	
Wetumpka	85	27	60.3	4.23	
Alaska.					
Killisnoo	47	19	32.8	2.75	3.0
Sitka	50	23	37.3	6.19	3.0
Arizona.					
Allaire Ranch				1.72	
Arizona Canal Co's Dam	86	39	64.6	1.92	
Aztec[*1]	95	35	61.7	2.00	
Benson[*1]	84	38	55.2	T.	
Bisbee	74	28	51.0	1.55	1.5
Bowie	79	19	46.4		
Buckeye	87	29	54.9	1.50	
Casagrande[*1]	78	40	57.4	1.15	
Champie Camp	92	25	55.2	5.25	
Cochise[*1]	68	35	52.6	1.95	
Congress	77	32	54.5	4.45	2.0
Dragoon Summit[*1]	75	30	47.7	1.04	2.0
Dudleyville	84	25	54.0	1.01	
Duncan	81	15	49.0	0.75	
Fort Apache	74	15	43.4	1.80	
Fort Defiance	60	7	33.2	1.80	1.0
Fort Grant	75	30	51.5	0.20	T.
Fort Huachuca	79	35	55.8	2.45	
Globe	82	25	52.7	1.57	
Jerome	71	28	46.2	3.00	9.0
Maricopa[*1]	85	35	54.0	1.10	
Mesa	84	30	55.8	1.43	
Mesa (near)	85	30	56.4	1.31	
Mount Huachuca	76	27	50.7	2.39	2.2
Natural Bridge				3.78	6.0
Nogales	81	28	51.4	2.41	1.2
Oracle	73	33	50.6	2.89	
Oro				1.36	
Phoenix	86	30	57.1	1.99	
Pima	80	19	50.7	0.88	
Pinal Ranch				4.00	2.0
Prescott	75	8	40.3	2.80	17.0
Sentinel[*1]	86	44	61.0	1.60	
Showlow				2.78	4.0
Signal	87	27	54.4	2.13	
Superstition				3.19	
Taylor	72	10	41.0	1.02	
Tonto	81	26	51.8	1.71	
Arizona—Cont'd.					
Tuba	72	25	48.3	0.97	
Tucson	81	30	55.0	1.34	
Vail[*5]	80	35	61.2	1.40	3.5
Walnut Grove				4.00	
Willcox[*1]	72	31	47.4	0.75	
Williams	65	1	35.2	2.00	20.0
Yarnell				4.96	10.0
Arkansas.					
Alco	80	28	55.6	6.82	T.
Amity	82	31	56.4	8.74	
Arkadelphia				7.92	
Arkansas City				5.39	
Batesville	85	28	56.6	6.61	
Beebranch	83[d]	28[d]	56.4[d]	6.40	
Blanchard	80	32	59.8	5.91	
Brinkley	89	39	55.8	4.49	
Camden *a*				6.16	
Camden *b*	80	34	59.8	6.50	
Conway	83	28	55.8	5.93	
Corning	83	26	53.2	5.86	0.3
Dallas	79	28	56.2	13.11	
Dardanelle				6.88	
De Queen	83[c]	32[c]	58.3[c]	9.99	
Dutton	74	21	54.2	10.09	
Eureka Springs	79	25	53.8	4.87	
Fayetteville	78	21	53.0	6.69	
Forrest City	82	30	57.2	3.97	T.
Fulton				9.36	
Hardy	84	28	55.1	5.38	T
Helena *a*				4.39	
Helena *b*	90	30	56.2	3.56	
Jonesboro	83[d]	27[c]	56.2[c]	4.96	T.
Lacrosse	83[c]	28[c]	55.0[c]	5.83	
Lake Village	85	31	61.0	4.64	
Lonoke	82	31	56.8	5.97	
Lutherville	81	22	52.9	8.61	T.
Malvern	83	30	57.2	8.20	
Marianna	78	27	56.8	3.55	T.
Marvell	82	31	58.6	4.20	
Mountain Home	82	27	53.2	6.15	
Mount Nebo	74	24	53.8	8.30	
New Gascony	83	29	58.4	4.05	
Newport *a*				6.05	
Newport *b*[d]	84	29	56.1		
Newport *c*	83	28	56.1	6.12	
Oregon	82	25	52.6	5.77	
Ozark	84	24	56.8	11.04	
Perry	80	31	55.8	5.96	
Pinebluff	83	29	57.4	4.98	
Pocahontas	85	23	54.8	4.56	
Pond	80	18	55.3	4.42	
Prescott	86	31		12.93	
Princeton	81	27	57.7	4.80	
Rison				4.63	
Rosadale	82	28	59.3	8.72	
Russellville	81	30	56.8	7.81	
Silversprings	80	22	53.6	5.94	
Spielerville	83	28	56.0	7.63	
Stuttgart	82	29	57.8	3.98	
Texarkana	82	30	59.8	9.18	
Warren	82	29	57.8	6.46	
Washington	78	30	58.8	10.33	
Wiggs	78	29	55.0	10.20	
Winchester	81	30	58.7	6.15	
Winslow	73	21	51.2	3.08	
Witts Springs	86	25	53.0	7.44	
California.					
Angiola	79	24	49.0	0.63	
Azusa	82	38	57.6	2.19	
Bakersfield		27		0.88	
Ballast Point L. H				2.06	
Berkeley	65	39	52.1	3.21	
Bishop	73	18	42.4	0.97	0.6
Bodie	56	−10	24.7	1.47	9.0
Bowman	62	18	38.6	10.04	19.0
Branscomb				27.29	T.
Caliente[*1]	76	40	53.0	1.98	
Campbell	70	31	50.8	2.17	
Campo				2.27	T.
Cape Mendocino L. H				10.35	
Cedarville	64	15	37.2	1.76	6.0
Chico				6.31	
Cisco[*1]	59	20	32.2	3.40	34.0
Claremont	86	31	53.4	1.51	
Cloverdale	71	30	51.6	10.53	
Colusa	68	32	50.6	2.64	
Corning[*1]	75	38	53.3	5.55	
Coronado	80	44	60.0	1.72	
Crescent City	64	35	50.2	18.59	
Crescent City L. H				20.61	
Cuyamaca	65	29	39.1	5.09	6.0
Delano[*1]	72	37	54.5	1.01	
Delta[*1]	71	34	51.8	14.33	
Drytown	72	29	49.3	2.90	
Dunnigan[*1]	68	36	51.6	3.73	
Durham[*5]	69	34	51.1	4.89	
East Brother L. H				4.10	
Edmanton[*1]	57	22	39.0	9.83	
Elcajon	89	34	56.1	1.73	
Elmdale	80	28	50.4	1.54	
Elsinore	90	31	56.2	1.26	
Escondido	82	28	52.4	2.35	
Fallbrook	84	36	53.8	2.86	
Folsom[*1]	73	35	52.0	2.15	
Fordyce Dam				6.14	27.5
Fort Bragg				10.66	
Fort Ross	68	35	52.1	14.16	
Foster				3.56	
Georgetown	67	29	46.1	6.66	
Gilroy (near)	78	26	51.1	1.44	
Greenville	64	15	40.1	5.26	0.5
Hanford	76	28	49.5	1.67	
Healdsburg	74	28	51.6	9.46	
Hollister	77	29	51.1	2.03	
Humboldt L. H				10.03	
Idylwild	74	15	43.6	3.80	2.5
Imperial	87	33	58.4	0.13	
Indio[*1]	84	42	61.4	0.50	
Iowa Hill[*1]	64	35	47.3	5.70	
Irvine	78	32	60.0	0.86	
Jackson	67	34	49.4	4.51	
Jolon				3.23	
Kennedy Gold Mine	67	28	43.9	4.50	
Kent	67	33	51.8	7.59	
Kono Tayee	60	39	49.7	4.35	
Laguna Valley				3.23	
Lamesa				2.20	
Laporte[*1]	54	23	35.8	10.37	24.4
Las Fuentes Ranch				3.16	
Legrande	75	30	49.4	2.14	
Lemoncove	83	33	55.7	2.05	
Lick Observatory	61	26	41.6	3.01	
Lime Point L. H				1.91	
Livermore	74	31	52.9	2.07	
Lodi	77	27	50.2	1.54	
Los Gatos	68	36	50.8	4.90	
Mammoth[*1]	87	38	64.2	T.	
Manzana	80	25	49.2	1.99	
Mare Island L. H				2.64	
Merced	75	30	50.1	2.25	
Mercury	70	36	55.0	11.12	
Milton (near)	73	33	51.8	2.55	
Modesto[*1]	80	33	58.2	1.55	
Mohave[*1]	70	30	53.8	0.84	
Mokelumne Hill[*3]	69	34	45.8	4.31	
Monterio	76	30	48.2	3.94	
Monterey[*1]	68	33	54.2	1.66	
Mount St. Helena				12.20	
Napa	70	33	51.8	4.13	
Needles				2.29	
Nevada	70	21	44.8	5.91	
Newhall[*1]	84	30	52.3	3.70	
Newman	75	30	51.2	1.53	
Niles	70	34	52.6	2.49	
North Bloomfield	67	25	43.6	6.09	
North Ontario	84	34	55.2	2.05	
North San Juan[*1]	76	28	51.0	6.08	
Oakland	66	38	52.9	2.37	
Ogilby[*1]	95	50	64.9	0.55	
Orland[*1]	85	40	59.8	4.60	
Palermo	73	29	49.8	3.49	
Paso Robles	74	21	46.2	0.71	
Peachland[*5]	68	34	52.6	7.46	
Piedras Blancas L. H				1.59	
Pigeon Point L. H				1.62	
Pilot Creek				7.59	2.0
Pine Crest	79	42	57.6	5.27	
Placerville	66	24	44.4	4.59	
Point Ano Nuevo L. H				1.88	
Point Arena L. H				7.41	
Point Bonita L. H				3.78	
Point Conception L. H				2.67	
Point Fermin L. H				1.94	
Point George L. H				7.84	
Point Hueneme L. H				3.35	
Point Lobos	65	45	54.2	2.20	
Point Loma L. H				1.19	
Point Montara L. H				3.15	
Point Pinos L. H				1.67	
Point Sur L. H				2.31	
Pomona (near)	82	32	53.8	1.22	
Porterville	79	31	53.4	1.42	
Poway	78	34	55.8	3.03	
Quincy	56	19	40.0	7.90	T.
Redding	68	33	50.4	7.72	
Redlands	82	32	54.6	1.40	
Reedley	77	28	49.4	1.58	
Represa	68	30	50.3	2.16	
Riovista	76	32	51.6	1.69	
Riverside	84	30	53.2	1.09	
Roe Island L. H				1.83	
Rohnerville[*5]	65	27	49.3	10.95	
Rosewood	67	28	48.2	5.45	
Sacramento	68	31	50.0	2.35	
Salinas	72	30	51.0	1.43	
Salton[*1]	85	39	62.6	0.22	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
California—Cont'd.	°	°	°	*Ins.*	*Ins.*
San Bernardino	89	28	54.3	1.94	
San Jacinto	84	30	52.9	1.25	
San Jose	72	32	53.2	2.18	
San Leandro	70	32	51.6	3.00	
San Luis L. H.				1.56	
San Mateo *1	68	39	53.5	3.37	
San Miguel *1	72	27	51.9	0.61	
Santa Barbara	80	42	57.6	4.01	
Santa Barbara L. H				3.30	
Santa Clara				2.22	
Santa Cruz	74	31	52.0	2.74	
Santa Cruz L. H				2.58	
Santa Maria	80	33	55.6	2.59	
Santa Monica	77	38	55.7	3.12	
Santa Paula	83	40	59.5	3.25	
Santa Rosa	78	28	51.4	5.00	
Shasta	70	30	50.1	12.14	
Sierra Madre	78	40	56.2	3.91	
Sonoma				4.57	
S. E. Farallone L. H				3.06	
Stockton	73	29	50.0	1.30	
Storey	73	28	48.2	1.14	
Summerdale	65	16	40.5	6.92	10.0
Susanville	59	18	37.5	2.48	
Tehama *1	70	38	54.9	5.10	
Tejon Ranch	76	36	51.2	2.68	
Trinidad L. H				11.83	
Truckee *1	60	20	35.1	2.20	22.0
Tulare *b*				1.36	
Tulare *c*	82	30	53.1	1.32	
Ukiah	65	27	49.1	9.21	
Upperlake	72	26	48.4	5.15	
Upper Mattole *1	70	32	49.9	23.02	
Vacaville *1	75	35	52.6	3.21	
Ventura	84	42	58.6	3.60	
Visalia	76	30	50.4	1.37	
Volcano Springs *5	89	33	63.0	0.95	
Wasco	75	27	50.2	0.85	
Westpoint				5.65	
West Saticoy				3.20	
Wheatland	67	30	49.6	2.11	
Williams *1	70	40	54.7	2.95	
Willits	68	28	49.0	16.00	
Willows	67	32	51.0	4.32	
Yerba Buena L. H				2.30	
Yreka	61	25	42.5	3.87	T.
Yuba City *5	71	23	54.0	3.08	
Zenia				17.99	T.
Colorado.					
Alford	64	6	36.8	0.46	5.2
Arkins				0.49	2.0
Ashcroft	58	−8	26.2	1.23	
Blaine	80	8	44.0	0.07	
Boulder	73	15	42.0	1.29	8.0
Boxelder				0.50	4.0
Breckenridge	56	−20	25.6	0.30	5.0
Buenavista				0.23	3.0
Canyon	75	8	42.2	0.68	T.
Castlerock	76	2	39.4	0.70	7.0
Cedaredge	68	7	37.9	1.01	4.6
Cheesman				1.50	3.8
Cheyenne Wells	77	9	40.0	T.	T.
Clearview	69	−2	34.8	0.51	6.8
Collbran	67	8	35.4	1.37	6.5
Colorado Springs	71	5	38.0	0.02	
Delta	74	2	38.0	0.38	0.2
Durango	67	11	38.3	0.92	T.
Fort Collins	69	4	36.1	0.27	2.5
Fort Morgan	71	7	36.0	0.40	
Fox	75	4	39.6	0.04	T.
Fruita *d*	68	12	37.4	1.33	T.
Garnett	62	−3	28.8	0.54	2.0
Gilman				1.33	13.2
Gleneyre	74	−1	37.4	0.28	1.5
Glenwood				0.65	4.0
Greeley	72	6	38.0	0.73	2.0
Gunnison	60	−9	29.0	1.02	5.6
Hamps	73	4	36.5	0.22	0.5
Hoehne	78	25	48.3	0.23	
Holyoke (near)	76	8	37.4	0.13	1.0
Husted	74	−5	35.2	0.11	1.0
Lake Moraine	54	3	29.3	1.44	17.8
Lamar	82	11	43.7	0.36	
Laporte				0.25	2.8
Las Animas	77	7	39.4	T.	
Lay	64	−7	30.2	0.72	3.9
Leadville (near)	54	−2	28.4	0.35	5.8
Leroy	73	9	38.3	0.09	0.5
Longs Peak	60	−6	29.3	1.25	17.5
Mancos	68	10	36.1	1.50	6.2
Marshall Pass				3.29	47.0
Meeker	67	−7	33.5	1.10	6.0
Mitchell				0.77	16.0
Montrose				0.32	
Moraine	62	8	34.4	0.68	10.0
Pagoda	68	−5	32.8	1.39	3.0
Parachute	69	9	38.3	1.37	T.
Rangely	69	4	35.6	0.41	
Rockyford	77	9	41.7	0.41	T.
Rogers Mesa	70	6	37.9	0.84	0.9
Ruby				2.61	37.0
Russell	56	−8	29.0	0.97	8.0
Saguache	58	5	30.6	0.32	T.
Salida	68	0	37.6	0.80	8.0
San Luis	65	1	32.8	0.31	2.1
Santa Clara	67	4	36.6	0.95	11.0
Silt	67	6	37.9	0.56	
Sugarloaf	60	5	33.8	1.30	13.0
Trinidad	72	12	42.4	0.48	4.0
Twinlakes				0.22	3.2
Vilas				0.20	
Wagon Wheel	60	−10	26.0	0.68	12.0
Wallet				T.	T.
Westcliffe	65	−4	33.4	1.38	10.9
Whitepine	51	−13	21.6	1.38	18.5
Wray	77	8	40.2	0.16	
Yuma				0.20	0.5
Connecticut.					
Bridgeport	65	25	46.3	1.45	T.
Canton	70	20	42.8	1.06	1.5
Colchester	67	22	46.3	1.36	T.
Falls Village				1.01	3.0
Gaylordsville				1.04	1.5
Hartford *b*	63	23	43.8	1.37	1.0
Hawleyville	69	20	45.4	0.84	T.
Lake Konomoc				1.26	
New London	67	26	46.1	0.59	T.
North Grosvenor Dale	69	19	43.4	0.92	
Norwalk	66	20	44.6	1.30	0.5
Southington	68	19	44.9	0.65	
South Manchester				1.23	5.0
Storrs	67	20	44.2	1.10	
Voluntown	68	17	45.7	1.45	
Wallingford				1.64	1.0
Waterbury	69	20	45.4	1.34	1.5
West Cornwall	64	19	42.4	0.75	0.5
West Simsbury				0.98	3.0
Delaware.					
Milford	80	29	54.0	3.78	
Millsboro	80	28	52.6	2.32	
Newark	73	27	48.9	3.00	
Seaford	74	30	53.2	3.16	
District of Columbia.					
Distributing Reservoir *5*	74	31	52.8	2.86	
Receiving Reservoir *5*	70	29	51.6	2.31	
West Washington	78	25	50.8	3.78	
Florida.					
Archer	86	35	66.0	4.21	
Avon Park	88	44	71.4	1.77	
Bartow	89	47	73.2	1.48	
Bonifay	84	31	63.2	5.00	
Brooksville	89	39	69.7	2.57	
Carrabelle	83	35	66.5	7.82	
Clermont	88	41	71.5	1.38	
De Funiak Springs	80	29	61.8	4.98	
Deland	85	39	68.6		
Eustis	89	39	70.5	1.30	
Federal Point	86	40	69.1	3.52	
Fernandina	81	38	65.6	4.58	
Fort George *1*	81	38	67.7		
Fort Meade	90	39	70.5	2.40	
Fort Myers	83	46	70.8	0.96	
Fort Pierce	88	46	72.4	2.42	
Gainesville	85	35	67.6	4.27	
Grasmere	84	39	69.2		
Holt	81 *e*	30 *e*	62.5 *e*	4.10	
Huntington	87	37	68.5	3.03	
Hypoluxo	88	47	75.0	3.58	
Inverness	83	38	67.7	2.68	
Jasper	84	33	65.2	5.42	
Johnstown	85 *1*	34 *k*	63.0 *k*	3.68 *l*	
Kissimmee	88	41	71.4	1.15	
Lake City	86	32	66.4	3.20	
Macclenny	90	32	66.8	3.36	
Malabar	88	44	71.9	2.98	
Manatee	87	46	61.0	1.42	
Marco	89	53	74.3	1.86	
Marianna	81	32	61.8	3.79	
Merritt Island	82	47	72.2	1.43	
Miami	87	51	75.0	7.12	
Micanopy *d*	91	34	67.1	2.50	
Molino	87	30	62.4	3.55	
New Smyrna	85	38	70.3	0.65	
Nocatee	88	45	71.8	2.44	
Ocala	86	37	67.8	2.81	
Orlando	84	42	70.2	0.52	
Pinemount	85	32	65.0	4.12	
Rideout	86	32	65.9	3.85	
Rockwell	85	36	68.8	3.90	
St. Andrews	81	32	62.8	5.91	
St. Augustine	83	37	68.2	3.30	
St. Leo	88	39	70.2	2.23	
Stephensville	85	33	65.8	2.40	
Sumner	85	36	66.6	3.88	
Switzerland	84	36	67.2	3.86	
Florida—Cont'd.					
Tallahassee	79	34	64.0	6.11	
Tarpon Springs	88	41	70.4	2.24	
Titusville	86	40	70.2	1.77	
Wausau *f*	87	28	61.8	4.65	
Wewahitchka	85	34	64.4	5.71	
Georgia.					
Adairsville	76	30	56.5	4.19	T.
Albany	78	31	58.0	2.17	
Allapaha	86	29	61.2	2.78	
Alpharetta	79	25	55.8	3.84	T.
Americus	78	28	58.9	1.32	T.
Athens	75	29	57.4	2.72	
Bainbridge	80	29	61.2	1.55	
Blakely	79	32	61.4	4.26	
Bowersville	78	28	56.2	3.36	
Brent	80	26	58.3	5.94	
Butler				2.71	T.
Camak	78	27	58.6	2.49	
Canton				3.35	
Carlton				2.13	
Clayton	74	23	53.2	5.60	
Columbus	77	30	59.6	3.11	
Covington	81	26	57.6	4.10	
Dahlonega	77	25	55.3	4.01	0.3
Diamond	75	30	54.0	5.11	T.
Douglas	85	29	62.6	5.32	
Dublin				3.16	
Dudley	80	25	59.6	3.12	
Eastman	86 *c*	29 *c*	60.8 *c*	2.38	
Elberton	76	26	56.9	3.10	T.
Experiment	78	26	57.6	4.53	T.
Fitzgerald	87	28	61.2	3.33	
Fleming	88	28	62.5	5.78	
Fort Gaines	82	29	61.0	3.40	
Gainesville	73	28	56.2	4.31	
Gillsville	80	27	57.6	4.23	
Greensboro	78	24	57.2	3.08	
Griffin	80	27	59.0	3.37	T.
Harrison	81	28	59.5	2.96	
Jesup	85	29	63.4	6.89	
Lost Mountain	81	28	59.0	4.00	T.
Louisville	79	28	58.6	2.78	
Lumpkin	84	26	61.6	2.51	T.
Marshallville	81	26	60.9	3.36	T.
Mauzy	85 *d*	27 *c*	62.1 *d*	3.43	
Milledgeville	79	28	57.7	3.97	
Millen	88 *c*			2.34	
Monticello	84	27	59.8	2.71	
Morgan	80	26	58.4	4.64	
Naylor	83	30	62.9	6.36	
Newnan	74	25	56.4	5.31	
Oakdale				2.68	
Pelham	79				
Point Peter	80 *c*	24 *c*	56.4 *c*	3.41	
Poulan	85	25	60.5	3.65	
Putnam	81	26	58.8	3.12	
Quitman	81	31	62.5	4.42	
Ramsey	77	27	56.7	3.84	
Resaca				3.83	
Rome	78	26	55.6	3.82	
St. Marys	83	32	65.2	4.02	
Statesboro	82	30	62.3	3.22	
Stillmore				3.96	
Talbotton	82 *c*	25 *d*	58.2 *d*	3.33	T.
Tallapoosa	82	21	56.1	2.67	
Thomasville	84	31	64.0	2.87	
Toccoa	78	27	56.2	3.62	
Valona	82			3.91	
Vidalia	85	29	62.0	3.84	
Washington	75	28	57.1	4.90	
Waverly	87	30	64.6	5.02	
Waycross	82	32	62.5	3.62	
Westpoint	82	24	58.0	5.81	T.
Woodbury	80	25	55.7	2.85	
Idaho.					
Albion	65	7	34.4	1.18	2.0
American Falls	64	8	34.4	1.37	
Blackfoot	68	8	33.4	0.10	1.0
Blue Lakes	66	16	40.4	1.33	
Burnside	63	8	30.8	1.90	13.0
Cambridge	61	14	34.6	3.38	4.5
Downey	66	5	35.2	0.24	0.7
Forney	60	−3	29.2	2.53	20.0
Garnet	66	16	40.8	1.09	
Grangeville	57	19	36.8	2.10	4.0
Lakeview	49	18	36.9	6.57	3.5
Lost River	57	−4	27.6	1.62	12.0
Moscow	56	13	34.8	6.59	6.8
Murray	46	5	33.0	8.01	23.0
Oakley	62	9	35.5	0.60	T.
Ola	63	14	37.2	3.36	4.2
Payette	66	19	41.0	2.85	4.2
Pollock	70	26	43.1	1.55	
Porthill	48	15	34.1	3.19	T.
Priest River	47	8	33.6	6.98	14.5
Riddle	63	1	30.2	1.45	4.5
St. Maries	57	18	38.5	7.13	5.0
Silver City	53	9	30.2	5.12	40.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Idaho—Cont'd.	°	°	°	*Ins.*	*Ins.*
Soldier	57	— 8	26.8	1.42	11.0
Swan Valley	65	0	36.8	0.51	4.0
Thunder Mountain	47	4	25.7	3.01	37.5
Vernon	60e	— 0e	33.4e	1.90	1.5
Weston	65	12	35.1	1.03	2.0
Illinois.					
Albion	78	23	51.4	4.92	
Aledo	81	21	46.4	2.10	1.1
Alexander	77	24	49.6	3.08	0.5
Antioch	69	18	43.9	1.80	T.
Ashton	76	18	44.2	2.38	1.4
Astoria	73	24	47.7	2.64	0.2
Aurora	72	20	46.0	2.93	.....
Benton	82	28	53.8	4.89	0.2
Bloomington	76	24	49.1	2.75	1.0
Cambridge	71	22	45.2	2.11	1.0
Carlinville	78	24	50.4	3.23	T.
Carrollton	77	24	50.0	3.69	T.
Centralia	89	26	53.6	3.11	T.
Charleston	76	24	51.4	2.52	3.0
Chester	.....	.....	.....	3.97	
Cisne	.....	.....	.....	3.18	2.0
Coatsburg	76	20	47.4	2.85	1.0
Cobden	83	27	53.4	4.92	
Decatur	78	23	49.2	2.45	T.
Dixon	72	21	44.7	2.37	T.
Dwight	77	21	47.0	3.11	3.5
Effingham	79	22	52.4	2.81	
Equality	82	25	52.9	4.91	0.3
Fandon	74	23	46.3	1.71	2.6
Flora	79	24	51.5	2.85	1.0
Friendgrove	77	25	52.7	4.43	0.1
Galva	71	22	46.3	1.82	1.5
Grafton	.....	.....	.....	2.43	0.5
Greenville	79	24	50.7	3.41	T.
Griggsville	78	23	50.0	3.74	T.
Halfway	81	27	53.4	4.12	T.
Halliday	82	26	52.3	3.98	
Henry	73	20	48.1	3.38	0.5
Hillsboro	77	25	50.2	3.34	T.
Hoopeston	74	18	47.6	2.88	6.0
Joliet	71	22	45.6	2.99	1.4
Kishwaukee	72	18	44.0	2.94	1.5
Knoxville	72	17	46.1	2.00	0.2
Laharpe	74	22	46.0	2.90	3.0
Lanark	69	9	43.1	4.53	5.5
Lasalle	75	22	48.6	3.05	.....
Loami	.....	.....	.....	2.90	T.
McLeansboro	80	26	53.0	3.65	T.
Martinton	73	18	47.4	3.37	1.5
Mascoutah	76	24	50.8	3.53	0.7
Mattoon	76	26	49.8	2.22	1.4
Minonk	73	21	47.0	3.15	1.0
Monmouth	73	18	45.0	2.28	0.5
Morrison	72	18	45.4	2.91	2.0
Morrisonville	77	25	50.4	2.93	T.
Mount Carmel	.....	.....	.....	5.00	3.4
Mount Pulaski	79	24	49.5	2.62	T.
Mount Vernon	80	26	51.4	4.47	0.1
New Burnside	79	27	54.2	5.71	T.
Olney	78	25	52.0	3.51	5.3
Ottawa	74	23	48.9	4.29	2.0
Palestine	76	21	50.7	3.37	3.0
Pana	75	22	50.0	3.16	1.0
Paris	76	23	50.2	4.22	
Peoria a	.....	.....	.....	3.06	0.1
Peoria b	75	29	49.2	2.83	T.
Philo	76	13	47.6	3.23	6.0
Plumhill	80	26	52.0	3.76	
Rantoul	75	13	48.4	2.37	3.9
Raum	81	25	53.3	4.96	T.
Riley	69	21	44.8	2.87	.....
Robinson	77	24	50.2	3.61	4.0
Rushville	75	24	48.6	2.00	T.
St. Charles	71	18	46.0	2.98	0.4
St. John	80	26	52.7	4.10	
Shobonier	80	24	51.4	2.77	T.
Streator	73	22	47.8	3.48	3.1
Sullivan	78	22	49.6	2.54	2.0
Sycamore	71	20	45.0	2.95	0.5
Tilden	77	25	52.2	4.09	0.1
Tiskilwa	69	23	46.2	3.75	1.2
Tuscola	77	18	47.8	2.83	8.0
Urbana	75	14	47.2	2.43	2.5
Walnut	70	22	44.5	1.89	T.
Wellington	73	17	48.8	1.94	3.0
Winchester	76	26	49.2	3.48	T.
Winnebago	72	19	44.6	3.06	2.0
Yorkville	75	23	45.7	3.23	0.2
Zion	71	16	43.8	3.12	6.0
Indiana.					
Anderson	75	21	50.1	3.49	5.2
Angola	71	23	45.1	2.66	7.0
Auburn	72	25	47.1	2.07	T.
Avoca	78	23	50.0	3.69	1.5
Bloomington	73	27	50.8	4.51	4.0
Bluffton	74	16	47.9	2.27	3.5
Butlerville	78	29	51.8	5.70	1.2

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Indiana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cambridge City	73	25	47.2	2.77	2.1
Columbus	77	27	50.8	3.74	T.
Connersville	77	25	50.0	2.84	1.0
Crawfordsville	77	21	51.2	3.90	6.5
Delphi	75	19	46.9	3.07	4.0
Edwardsville	76	31	54.4	3.96	0.5
Elkhart	71	23	46.1	2.10	3.7
Farmland	73	24	49.0	3.67	9.5
Fort Wayne	78	20	48.8	3.06	2.0
Franklin*1	75	28	49.7	3.27	3.5
Greencastle	72	23	49.2	3.65	6.5
Greensburg	77	28	50.2	4.90	1.0
Hammond	71	21	45.2	3.29	T.
Hector	73	20	48.3	2.80	3.0
Holland	82	25	53.8	6.04	T.
Huntington	73	20	47.2	3.29	11.5
Jeffersonville	77	33	53.0	4.21	T.
Kokomo	74	21	49.0	3.12	3.6
Lafayette	73	19	49.0	3.47	4.2
Laporte	72	23	47.8	3.27	4.9
Logansport	74	24	48.0	2.37	T.
Madison a	85	30	52.0	3.69	T.
Madison b	.....	.....	.....	3.54	T.
Marengo	80	27	51.1	6.24	T.
Marion	75	19	49.0	3.45	11.7
Markle	74	18	48.0	2.82	4.2
Mauzy	76	22	49.0	3.55	4.5
Moores Hill	76	28	51.4	3.92	T.
Mount Vernon	81	33e	54.8	4.90	0.8
Northfield	73	11	47.2	3.61	9.0
Paoli	77	25	52.2	6.59	T.
Prairie Creek	79	20	50.2	2.60	
Princeton	76	24	51.4	4.26	3.5
Rensselaer	71	19	48.1	3.06	6.0
Richmond	86	25	49.1	3.48	2.0
Rockville	75	19	49.0	3.62	5.0
Salem	79	25	52.0	5.54	T.
Scottsburg	76	30	52.1	4.32	T.
Seymour	76	29	50.8	5.90	1.0
Shelbyville	75	30e	51.7	3.86	3.4
South Bend	72	21	48.0	3.35	7.5
Syracuse	72	24	47.8	3.18	8.0
Terre Haute	77	27	51.4	3.19	2.0
Topeka	70	20	48.6	2.30	4.0
Valparaiso	71	18	45.8	3.06	3.0
Vevay	76	33	53.2	4.15	T.
Vincennes	81	35	51.2	4.40	T.
Washington	78	25	51.6	4.38	
Winamac	74	21	46.0	3.37	5.0
Worthington	78	22	51.0	3.64	5.6
Indian Territory.					
Ardmore	78	27	55.2	10.18	
Chickasha	75	25	54.6	7.62	
Claremore	86	29	53.8	3.63	
Durant	78	29	57.6	7.44	
Fairland	81	22	54.1	4.55	
Goodwater	83	30	58.0	12.10	
Hartshorne	80	26	57.3	9.52	
Healdton	78	24	56.0	11.50	
Holdenville	79	26	56.0	5.45	
Marlow	76	27	54.1	10.87	
Muskogee	79	25	54.6	3.91	
Pauls Valley	76	25	53.2	9.40	
South McAlester	.....	.....	.....	9.57	
Tahlequah	81	23	56.2	5.23	T.
Tulsa	.....	.....	.....	3.55	
Wagoner	76	31	54.4	3.90	
Webbers Falls	.....	.....	.....	7.60	
Iowa.					
Afton	71	20	42.4	1.90	T.
Albia	75	22	45.8	3.34	T.
Algona	70	13	38.8	2.50	1.5
Allerton	73	21	45.0	2.28	1.0
Alta	67	10	36.0	2.77	2.0
Amana	69	21	44.2	1.77	2.8
Ames	74	18	40.8	1.11	T.
Atlantic	73	14	40.3	2.68	0.2
Audubon	74	12	38.6	1.78	0.4
Baxter	74	20	43.1	2.30	1.0
Bedford	72	14	42.9	2.10	0.5
Belknap	73	18	45.0	2.65	4.0
Bonaparte	75	21	45.5	3.18	4.0
Britt	64	12	36.8	2.29	1.8
Buckingham	.....	.....	.....	2.17	3.0
Burlington	74	26	47.6	2.37	
Bussey	.....	.....	.....	1.88	
Carroll	77	10	38.5	2.51	0.8
Cedar Rapids	71	23	44.8	1.47	1.8
Chariton	76	22	44.1	2.89	0.2
Charles City	66	9	40.7	3.18	3.0
Chester	63	4	37.0	2.38	4.0
Clarinda	73	16	42.5	2.05	0.5
Clearlake	65	12	37.2	2.39	2.0
Clinton	71	18	44.6	2.51	3.5
College Springs	71	16	43.1	3.66	0.5
Columbus Junction	72	20	45.5	3.16	4.8
Corning	70	15	41.5	2.04	0.7
Council Bluffs	75	15	40.6	1.67	0.1

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Iowa—Cont'd.	°	°	°	*Ins.*	*Ins.*
Cumberland	.....	.....	.....	1.37	T.
Danville	.....	.....	.....	1.98	2.0
Decorah	65	11	40.4	2.07	3.5
Delaware	65	11	40.9	1.79	4.3
Denison	69	9	38.4	1.40	1.5
De Soto	71	21	43.0	1.90	T.
Dows	69	17	39.5	2.22	T.
Earlham	72	15	40.8	2.14	T.
Eldon	77	21	45.7	2.10	3.0
Elkader	67	15	43.2	1.91	2.0
Emerson	.....	.....	.....	2.05	
Estherville c	62	12	32.6	.....	
Fairfield	74	12	44.4	2.11	0.2
Fayette	66	11	40.2	2.13	3.1
Forest City	63	12	37.4	2.34	2.0
Fort Madison	.....	.....	.....	2.69	
Galva	.....	.....	.....	2.78	1.5
Grand Meadow	65	16	40.4	2.15	3.2
Greene	68	14	40.2	2.32	2.5
Greenfield	73	14	42.5	1.46	0.1
Grinnell	69	20	42.0	2.16	1.5
Grinnell (near)	70	18	43.0	2.05	2.5
Grundy Center	71	17	41.2	2.28	2.5
Guthrie Center	73	17	40.6	1.91	T.
Hampton	72	18	40.4	2.16	2.0
Hanlontown	65	10	37.0	2.14	2.0
Harlan	72	15	38.0	1.45	1.0
Hopeville	.....	.....	.....	1.90	T.
Humboldt	67	15	40.0	2.28	T.
Idagrove	.....	.....	.....	0.21	1.0
Independence	67	21	41.4	1.40	2.5
Indianola	71	24e	45.0e	2.59	T.
Iowa City	74	16	44.8	2.25	3.0
Iowa Falls	70	19	39.5	1.90	1.0
Jefferson	.....	.....	.....	2.34	0.8
Keosauqua	75	21	46.4	3.22	3.0
Lacona	.....	.....	.....	2.55	
Lansing	67	12	40.9	1.75	T.
Larrabee	62	11	36.2	1.48	2.2
Leclaire	.....	.....	.....	1.54	0.5
Lemars	64	11	36.8	0.35	T.
Lenox	71	15	42.0	1.58	0.5
Leon	71	22	44.3	2.37	0.5
Logan	72	12	39.6	1.53	2.0
Maple Valley	.....	.....	.....	3.16	2.5
Maquoketa	70	14	44.2	2.17	
Marshalltown	73	21	43.6	2.66	1.0
Mountayr	70	19	42.8	2.00	1.0
Mount Pleasant	72	15	43.0	1.82	7.0
Mount Vernon	71	15	44.4	0.77	3.9
New Hampton	64	10	38.6	2.37	4.0
Newton	69	21	43.0	2.56	2.5
Northwood	65	9	37.6	2.42	3.2
Odebolt	67	15	36.7	1.78	2.5
Ogden	77e	22e	43.3e	2.02	0.5
Olin	68	12	43.6	1.72	2.2
Onawa	67	13	39.2	3.15	2.1
Osage	62	10	38.1	2.10	5.2
Osceola	72	20	43.6	3.54	.....
Oskaloosa	73	22	44.9	1.87	0.5
Ottumwa	75	27	46.5	2.25	1.5
Ovid	74	19	44.9	2.44	1.0
Pacific Junction	72	14	40.6	1.48	1.2
Perry	74	20	41.6	2.51	.....
Plover	63	11e	35.5e	2.45	1.0
Redoak	70	18	44.2	3.31	0.5
Ridgeway	69	14	41.9	2.48	2.8
Rockford	.....	.....	.....	1.85	2.5
Rockwell City	68	19	38.0	1.66	
Sac City	68	12	38.4	1.97	2.7
St. Charles	74	21	44.4	2.59	0.4
Scranton	67	16e	38.8	1.40	0.3
Sheldon	61	15	37.0	0.47	0.5
Sibley	60	11	35.4	0.53	0.5
Sigourney	78	21	45.4	2.44	2.0
Sioux Center	59	11	34.9	0.35	1.5
Spirit Lake c	60	12	34.4	.....	.....
Stockport	.....	.....	.....	4.19	6.0
Storm Lake	66	12	37.1	2.94	2.5
Thurman	73	13	41.0	2.71	.....
Tipton	72	18	43.8	2.72	3.2
Toledo	72	20	42.8	2.57	2.0
Vinton*1	69	22	42.4	1.76	2.0
Wapello	70	25	45.8	2.44	4.0
Washington	74	17	42.9	2.35	
Washta	.....	.....	.....	1.82	2.0
Waterloo	70	19	41.9	1.83	2.3
Waukee	.....	.....	.....	1.86	T.
Waverly	69	17	40.8	2.36	2.5
Westbend	64	14	37.8	1.87	1.0
Westbranch	.....	.....	.....	1.92	3.0
West Union	.....	.....	.....	1.94	3.0
Whitten	71	18	41.8	1.68	0.5
Wilton Junction	71	16	44.8	3.24	7.0
Winterset	73	19	43.4	2.26	T.
Woodburn	.....	.....	.....	2.45	T.
Kansas.					
Achilles	79	8	40.2	0.06	T.

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kansas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Anthony	.....	.....	.....	1.07	
Atchison *a*	73	21	46.8	1.96	1.0
Beloit	76	16	43.6	.....	
Burlington	75	19	50.4	2.74	
Clay Center	78	22	46.0	1.76	T.
Colby	78	8	40.6	0.03	
Columbus	78	21	51.4	4.15	
Cunningham	83	17	47.6	1.14	
Delphos	79	14	46.2	0.99	T.
Dresden	77	14	41.0	T.	T.
Ellinwood	82	17	46.2	0.91	T.
Englewood	80	16	45.4	1.07	
Eureka Ranch	.....	10	.....	0.04	0.2
Farnsworth	83	10	43.0	T.	T.
Fort Leavenworth	74	27	48.6	1.57	
Fort Scott	76	23	50.8	4.06	
Frankfort	78	14	44.9	2.58	T.
Fredonia	77	18	51.4	2.46	
Garden City	83	10	45.2	0.20	
Gove	80	15	43.6	T.	
Grenola	77	17	49.7	3.19	T.
Hanover	72	15	43.2	1.95	1.0
Harrison	76	11	41.4	0.31	0.1
Hays	78	10	42.4	T.	
Holton	74	18	46.1	2.71	T.
Horton	73	17	45.3	2.83	T.
Hoxie	77	11	41.8	T.	T.
Hutchinson	82	14	47.2	1.48	
Independence	77	21	52.0	6.26	
Jetmore	79	11	44.3	0.45	T.
La Crosse	77	9	43.6	0.25	T.
Lakin	82	10	42.8	0.15	
Lawrence	78	21	47.6	2.09	T.
Lebanon	75	14	41.1	.....	
Lebo	76	20	48.2	2.42	T.
Little River	82	13	46.4	0.96	T.
Macksville	74	16	43.5	1.13	T.
McPherson	78	18	46.1	1.30	T.
Madison	77	19	49.4	1.84	
Manhattan	81	18	48.0	2.41	T.
Marion	75	19	48.0	2.25	T.
Medicine Lodge	85	16	49.0	0.79	
Minneapolis	78	17	45.3	1.86	T.
Moran	75	18	51.2	1.86	
Mounthope *1	76	23	48.2	1.21	
Ness City	80	15	46.6	0.04	T.
Newton	77	15	47.6	1.74	
Norwich	80	19	48.2	1.15	
Olathe	75	20	48.6	2.35	T.
Oswego	78	20	52.2	3.97	
Ottawa	77	18	48.1	2.15	T.
Pratt	81	16	46.4	0.75	
Republic	76	13	42.1	1.37	
Rome	79	17	50.2	2.36	
Salina	79	15	47.8	2.28	T.
Sedan	78	19	51.0	2.96	
Seneca	74	18	44.8	2.01	0.8
Toronto	78	17	48.8	3.52	
Ulysses	81	11	44.5	T.	
Valley Falls	73	18	47.4	1.93	0.2
Viroqua	82	12	44.2	0.44	T.
Wakeeney	.....	.....	.....	0.02	0.2
Wamego *1	74	20	45.5	2.42	T.
Winfield	75	19	49.9	3.08	
Kentucky.					
Alpha	81	27	55.0	6.77	T.
Anchorage	78	27	52.1	4.35	T.
Bardstown	80	29	54.4	4.31	
Beattyville	.....	.....	.....	3.50	0.5
Berea	78	28	53.8	4.33	T.
Blandville	78	28	53.6	4.90	T.
Bowling Green	77	20	51.5	4.49	0.5
Burnside	75	28	52.1	5.16	T.
Cadiz	84	25	55.3	4.75	T.
Carrollton	78	31	53.6	3.38	
Catlettsburg	79	28	52.6	3.15	T.
Earlington	79	25	53.9	5.04	0.2
Edmonton	79	25	53.4	4.29	0.1
Eubank	77	28	50.8	3.98	T.
Falmouth	.....	.....	.....	3.51	
Fords Ferry	80	24	53.8	5.93	
Frankfort	76	30	52.4	3.80	T.
Franklin	79	29	57.0	3.45	T.
Greensburg	80	28	52.8	5.05	
Henderson	81	28	54.2	5.48	T.
High Bridge	75	32	53.0	3.39	T.
Hopkinsville	81	29	54.6	5.14	0.5
Irvington	79	27	54.2	3.68	T.
Jackson	85	31	56.3	5.92	T.
Leitchfield	78	25	52.8	4.45	0.5
Loretto	78	26	53.0	4.29	T.
Manchester	79	29	52.0	5.50	T.
Marrowbone	76	23	51.2	3.80	T.
Mayfield	77	28	55.3	4.47	2.5
Maysville	79	31	52.6	3.23	T.
Middlesboro	76	29	53.5	4.10	T.
Mount Sterling	74	31	51.7	4.14	T.
Owensboro	80	29	54.9	5.48	T.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Kentucky—Cont'd.	°	°	°	*Ins.*	*Ins.*
Owenton	73	27	50.0	5.43	1.5
Paducah *a*	.....	.....	.....	5.90	T.
Paducah *b*	82	29	56.4	6.68	T.
Pikeville	90	26	55.0	4.13	
Princeton	.....	23	.....	4.13	1.5
Richmond	78	28	51.8	3.55	
St. John	77	25	53.2	4.67	T.
Scott	77	29	51.8	3.52	0.8
Shelby City	80	27	52.7	4.33	T.
Shelbyville	77	29	51.9	3.36	T.
Taylorsville	77	28	51.7	4.38	
Warfield	83	25	53.2	5.18	1.5
Williamsburg	80	29	54.8	5.86	T.
Williamstown	77	29	53.5	3.81	1.5
Louisiana.					
Abbeville	82	36	64.5	3.92	
Alexandria	85	32	63.2	5.67	
Amite	84	32	62.2	2.58	
Baton Rouge	81	35	62.4	4.90	
Burnside	85	36	64.4	5.21	
Calhoun	80	29	61.8	5.63	
Cameron	79	36	64.9	3.47	
Cheneyville	84	34	62.6	4.15	
Clinton	84	34	63.2	3.95	
Collinston	85	30	60.9	4.80	
Covington	86	34	64.0	4.08	
Donaldsonville	84	35	64.1	4.96	
Emilie	83	35	63.4	5.01	
Farmerville	81	30	57.3	.....	
Franklin	87	39	65.5	4.06	
Grand Coteau	80	36	63.2	4.20	
Hammond	82	35	63.1	4.06	
Houma	85	33	64.2	3.81	
Jeanerette	82	38	67.5	2.50	
Jennings	83	35	63.8	6.68	
Lafayette	84	36	64.2	4.38	
Lake Charles	82	40	65.4	6.22	
Lake Providence	83	32	62.6	5.59	
Lakeside	83	38	65.5	8.70	
Libertyhill	83	32	62.2	5.71	
Mansfield	82	32	61.3	6.10	
Melville	83	34	61.6	4.53	
Minden	83[c]	33[c]	60.9	5.76	
Monroe	83	36	62.1[c]	5.63	
New Iberia	83	39	66.2	4.10	
Opelousas	84	34	64.2	4.27	
Oxford	85	33	61.9	6.87	
Plain Dealing	88	32[c]	59.8	7.30	
Port Eads	82	44	70.0	5.42	
Reserve	.....	.....	.....	4.50	
Robeline	82	30	61.2	5.90	
Ruston	81	30	59.5	6.04	
Schriever	87	33	64.6	3.38	
Sugartown	79	37	63.4	6.93	
Venice	84	37	66.5	4.40	
Wallace	86	35	64.8	4.81	
Maine.					
Bar Harbor	60	25	40.6	1.79	0.5
Belfast	61	18	38.1	1.34	2.0
Carmel	66	16	39.2	2.02	2.0
Cornish	68	21	40.3	1.70	1.0
Fairfield	60	21	38.5	1.03	
Farmington	63	19	37.2	1.19	2.5
Fort Fairfield	65	6	34.0	0.95	3.5
Gardiner	61	23	39.6	1.21	
Houlton	62	13	38.2	1.88	9.0
Kineo	58	18	35.2	0.81	5.5
Lewiston	64	24	39.6	1.45	0.8
Mattawamkeag	.....	.....	.....	1.47	4.0
Mayfield	58	14	34.8	1.65	5.0
Millinocket	.....	.....	.....	1.88	5.2
North Bridgton	64	22	39.2	1.78	1.0
Orono	58	18	37.2	1.76	3.0
Rumford Falls	56	20	35.7	1.47	3.5
Solon	.....	.....	.....	1.42	0.2
The Forks	.....	.....	.....	2.30	5.0
Vanburen	65	7	32.6	2.24	14.2
Vanceboro	68	30	45.8	0.90	4.0
Winslow	62	17	38.0	1.17	0.8
Maryland.					
Annapolis	78	25	52.9	5.40	
Bachmans Valley	71	21	47.2	3.57	T.
Boettcherville	79	20	49.9	1.96	1.5
Cambridge	73	32	52.0	2.70	
Chase	79	23	51.5	3.66	
Cheltenham	77	23	51.0	3.28	
Chestertown	72	29	50.6	3.88	
Chewsville	78	18	49.5	2.48	1.0
Clearspring	77	24	49.8	2.16	
Coleman	76	28	51.8	3.89	
Collegepark	76	23	49.8	3.95	
Colora	.....	.....	.....	2.72	
Cumberland *b*	.....	.....	.....	1.84	1.0
Darlington	75	25	50.3	2.25	
Deerpark	70[c]	13[c]	44.2[c]	2.50	3.0
Denton	75	31	53.5	1.85	
Easton	73	27	51.6	3.07	
Fallston	75	26	50.2	3.29	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Maryland—Cont'd.	°	°	°	*Ins.*	*Ins.*
Frederick	80	24	51.8	3.43	
Grantsville	69	12	49.4	1.85	2.2
Greatfalls	77	22	51.7	3.09	
Greenspring Furnace	75	21	49.4	2.52	1.0
Hancock	77	20	51.8	1.84	T.
Harney	.....	.....	.....	3.11	
Jewell	76	29	52.6	3.55	
Johns Hopkins Hospital	76	30	50.8	3.11	
Laurel	78	22	49.8	3.70	
McDonogh	75	21	49.6	4.29	
Mount St. Marys College	74	25	49.6	3.01	T.
Newmarket	75	25	50.2	3.69	T.
Pocomoke	74	32	54.0	3.36	
Princess Anne	75	26	52.4	3.27	
Queenstown	74	29	50.8	4.33	
Solomons	75	32	54.3	2.32	
Sudlersville	78	27	51.4	3.68	
Sunnyside	69	11	45.0	3.69	4.0
Takoma Park	75	25	50.4	3.54	
Van Bibber	72	26	50.2	3.57	
Westernport	74	21	49.9	2.34	T.
Woodstock	73	26	52.3	2.93	
Massachusetts.					
Amherst	65	18	42.4	1.27	1.5
Bedford	66	21	43.4	0.82	T.
Bluehill (summit)	67	21	44.0	1.33	T.
Cambridge	67	23	45.3	1.19	
Chestnuthill	68	23	45.7	1.46	0.5
Cohasset	.....	.....	.....	1.68	T.
Concord	69	18	42.8	0.85	0.1
East Templeton *1	58	20	40.0	0.32	0.5
Fall River	64	27	46.6	1.48	T.
Fitchburg *a* *1	62	22	41.6	0.73	
Fitchburg *b*	66	22	43.0	0.45	T.
Framingham	67	19	42.8	1.36	
Groton	64	18	40.8	0.97	3.0
Holyoke	.....	.....	.....	1.23	
Hyannis	63	24	47.2	2.68	
Jefferson	.....	.....	.....	0.95	1.5
Lawrence	68	25	43.4	0.78	1.0
Leominster	.....	.....	.....	0.65	T.
Lowell *a*	68	23	44.4	0.86	
Lowell *b*	69	22	43.4	.....	
Ludlow Center	61	12	39.2	1.39	2.0
Middleboro	69	17	44.7	1.64	T.
Monson	66	16	42.1	0.93	
Narragansett	70	22	46.0	1.59	
New Bedford *a*	66	23	46.2	1.85	
Pittsfield	.....	.....	.....	0.94	1.5
Plymouth *1	67	25	46.5	1.72	
Princeton	.....	.....	.....	0.92	2.0
Provincetown	62	29	47.8	1.96	
Somerset *1	70	20	48.2	1.88	T.
Sterling	.....	.....	.....	0.76	T.
Taunton *c*	67	15	43.8	1.76	T.
Webster	.....	.....	.....	0.74	
Westboro	71	20	45.2	1.42	1.5
Weston	67	20	44.0	0.92	T.
Williamstown	66	11	42.2	0.97	1.8
Winchendon	.....	.....	.....	1.00	
Worcester *b*	68	25	44.2	0.66	1.0
Michigan.					
Adrian	70	16	45.6	1.25	1.0
Agricultural College	69	13	43.0	2.46	5.0
Allegan	70[c]	18[c]	43.3[c]	2.86	2.0
Alma	69	17	44.4	3.19	4.0
Ann Arbor	70	18	45.0	1.83	3.6
Annpere	75	19	45.4	1.52	3.0
Arbela	73	18	47.3	3.53	2.0
Baldwin	66	13	42.5	2.45	0.5
Ball Mountain	71	16	43.7	2.58	4.5
Baraga	64	10	35.6	.....	T.
Battlecreek	68	22	45.4	3.61	5.0
Bay City	68	19	44.1	2.44	1.2
Berlin	69	18	44.4	1.72	3.1
Berrien Springs	70	26	47.3	3.07	4.0
Big Rapids	68	14	42.4	2.53	2.0
Birmingham	70	13	43.6	1.21	3.0
Boon	63	13	39.8	1.66	2.5
Calumet	58	18	35.0	3.87	8.0
Carsonville	76	21	46.0	.....	
Cassopolis	71	25	45.2	3.50	4.5
Charlevoix	67	12	39.2	5.05	0.5
Charlotte *	70	25	47.8	1.97	
Chatham	59	13	36.4	3.66	0.5
Cheboygan	71	15	40.6	3.45	0.5
Clinton	73	16	46.0	1.59	4.0
Coldwater	.....	19	.....	2.60	3.0
Deerpark	58	16	38.1	2.93	1.9
Detour	59	15	39.6	5.29	2.0
Dundee	73	18	46.4	1.45	2.2
Eagle Harbor	58	20	36.6	3.93	T.
East Tawas	66	22	48.7	1.65	0.5
Eloise	71	17	45.9	1.15	2.5
Fennville	69	25	46.4	3.71	2.0
Fitchburg	69	12	44.2	2.37	5.5
Flint	70	18	43.9	2.90	2.0
Frankfort	62	35	49.2	1.97	

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
Michigan—Cont'd.	°	°	°	*Ins.*	*Ins.*
Gaylord	65	12	39.2	6.00	1.0
Gladwin	73	15	42.4	2.45	2.0
Grand Marais	58	18	39.6	3.53	0.5
Grand Rapids	70	12	43.0	4.62	2.5
Grape	73	18	45.8	1.51	3.0
Grayling	65	16	40.8	3.85	2.5
Hagar	71	26	48.4	5.14	1.0
Harbor Beach	69	12	45.0	1.60	
Harrison	69	18[e]	38.4[e]	2.63	1.0
Harrisville	68	16	42.2	1.94	0.1
Hart	65	23	45.4	2.05	
Hastings	70	18	45.3	2.81	4.1
Hayes	70	25	44.9	2.03	
Highland Station	.....	.....	.....	2.14	6.0
Hillsdale	71	20	45.0	2.16	4.0
Humboldt	56	7	32.6	2.01	T.
Iron Mountain	56	9	34.6	2.74	T.
Iron River	59	6	33.4	4.30	0.5
Ironwood	56	12	33.2	2.85	4.9
Ishpeming	58	4	33.8	3.05	2.0
Ivan	65	19	41.0	2.73	2.0
Jackson	70	20	44.6	1.52	2.5
Jeddo	69	16	44.3	1.86	2.5
Kalamazoo	70	25	44.2	3.65	5.5
Lake City	62	15	44.0	1.37	2.0
Lansing	69	20	44.6	2.41	5.0
Lapeer	71	18	44.7	1.01	
Lathorp	62	10	36.7	1.80	T.
Lincoln	70	15[e]	42.9	0.80	
Ludington	65	26	44.3	0.92	
Mackinac Island	69	19	40.8	4.26	0.6
Mackinaw	67	19	40.8	5.87	1.5
Mancelona	67	18	44.8	4.15	1.0
Manistee	65	24	43.4	0.53	0.1
Manistique	54	18	39.0	4.00	
Menominee	62[k]	17[j]	39.6[k]	2.03	T.
Midland	68	22	44.2	2.39	0.4
Mio	68	13	41.0	2.86	2.9
Mount Clemens	70[e]	16	45.9[e]	1.30	T.
Mount Pleasant	69	18	44.8	1.75	1.0
Muskegon	67	25	45.8	2.25	0.4
Newberry	.....	16	.....	2.20	
North Marshall	68	20	44.3	1.85	2.0
Old Mission	65	25	41.9	3.66	T.
Olivet	67	24	45.2	2.55	3.0
Omer[f]	66	28	47.2	1.69	T.
Onaway	69	12	41.1	4.07	0.5
Ontonagon	58	18	36.0	3.66	3.0
Ovid	68	16	45.0	2.58	2.0
Owosso	.....	13	.....	1.80	1.0
Petoskey	68	24	41.4	3.15	0.5
Plymouth	72	21	45.4	1.33	2.0
Port Austin	69	12	44.6	1.45	
Powers	60	10	39.0	.....	
Reed City	60	11	41.0	2.57	2.0
Roscommon	68	14	41.6	0.44	0.3
Saginaw	70	18	45.2	2.52	2.2
St. Ignace	.....	.....	.....	3.88	T.
St. Johns	69	21	45.8	2.13	2.0
St. Joseph	70	27	47.4	3.25	1.2
Sidnaw	.....	.....	.....	1.51	T.
Somerset	71	23	44.4	1.19	T.
South Haven	70	25	46.7	3.92	5.0
Stanton	68	15	44.4	2.53	1.8
Thomaston	60[e]	7	30.9	2.43	2.0
Thornville	70	20	44.4	2.02	5.0
Vans Harbor	54	27	39.6	1.51	2.5
Vassar	70	18	45.8	1.37	T.
Wasepi	70	22	45.4	2.66	4.0
Waverly	70	25	46.4	4.00	2.0
Webberville	70	17	45.6	1.84	3.0
West Branch	67	14	41.2	2.81	3.0
Wetmore	59	8	35.2	3.03	T.
Whitefish Point	57	16	37.8	3.86	T.
Ypsilanti	71	19	44.2	2.05	4.0
Minnesota.					
Ada	62	5	28.8	0.29	2.0
Albert Lea	63	12	34.7	3.11	4.0
Alexandria	56	10	32.0	0.32	T.
Angus	56	— 1	24.6	0.46	4.0
Ashby	54	9	31.3	0.45	1.5
Beardsley	58	2	31.9	0.57	1.0
Beaulieu	56	— 3	28.6	0.46	5.0
Bemidji	54	1	30.6	0.68	.....
Bird Island	65	10	34.2	0.75	0.7
Blooming Prairie	63	7	36.2	3.52	3.2
Brainard[f]	55	18	35.6	1.65	0.5
Caledonia	64	11	38.8	2.72	3.0
Collegeville	57	9	34.8	1.17	1.1
Crookston	55	5	28.6	0.42	3.0
Currie	67	10	34.4	.....	
Deephaven	.....	.....	.....	1.64	2.2
Detroit	54	— 2	28.4	0.90	5.0
Duluth	55	4	31.0	2.49	4.5
Faribault	63	13	35.3	2.70	0.8
Farmington	66	14	35.8	2.47	3.5
Fergus Falls	55	7	31.4	1.38	2.9
Glencoe	64	2	33.2	1.37	T.
Grand Meadow	62	17	35.7	2.57	4.8
Hallock	58	— 7	25.8	0.56	4.2
Lake Winnibigoshish	53	1	29.1	1.51	8.0
Leech	58	— 2	30.4	1.73	6.5
Long Prairie	56	11	32.6	1.38	0.2
Luverne	69	10	33.9	0.65	T.
Lynd	57	7	35.0	0.76	0.5
Mapleplain	63	13	35.0	1.66	4.1
Milaca	58	8	32.5	2.06	3.0
Milan	58	7	32.4	1.04	0.2
Minneapolis *b*	61	15	35.2	1.86	2.5
Montevideo	59	2	33.2	0.98	0.5
Morris	56	10	31.8	0.68	0.6
Mount Iron	51	— 4	29.7	2.13	5.0
New London	58	10	31.6	0.60	1.0
New Richland	64	12	37.0	2.04	T.
New Ulm	65	11	37.4	1.58	2.5
Park Rapids	55	1	29.8	1.27	6.2
Pine River	58	7	32.4	1.73	1.0
Pipestone	69	6	33.6	0.86	0.2
Pleasant Mounds	65	9	36.4	1.79	1.2
Pokegama Falls	54	— 8	28.2	2.55	4.8
Redwing *a*	.....	.....	.....	4.02	1.5
Redwing *b*	63[j]	.....	.....	3.28	1.0
Reeds	.....	.....	.....	3.45	1.5
Rolling Green	65	14	35.6	2.16	5.0
St. Cloud	62	13	35.6	1.53	1.0
St. Peter	68	10	36.8	2.01	1.5
Sandy Lake Dam	53	— 1	30.8	2.46	3.8
Shakopee	63	15	36.7	1.86	1.5
Tower	58	9	30.4	2.40	11.0
Two Harbors	54	6	32.8	1.79	2.3
Wabasha	64	12	39.2	3.27	2.2
Willow River	57	6	33.6	2.38	4.4
Winona	66	18	40.6	2.09	1.0
Worthington	65	14	35.0	0.98	0.7
Mississippi.					
Aberdeen	80	26	56.0	4.50	
Agricultural College	81	31	58.6	4.79	T.
Austin	79	30	58.0	6.08	
Batesville	80	28	58.1	6.07	
Bay St. Louis	76	37	63.8	2.89	
Biloxi	79	38	65.6	3.58	
Booneville	80	27	56.1	5.70	T.
Brookhaven	83	32	62.0	4.35	
Canton	84	28	60.6	3.19	
Columbus	80	28	56.8	5.25	
Corinth	79	27	56.4	5.86	
Crystalsprings	84	30	61.2	4.47	
Duck Hill	84	24	61.6	5.67	T.
Edwards	89	31	63.2	3.43	
Fayette	83	31	61.6	5.65	
Fayette (near) [*i*]	.....	.....	.....	4.03	
Greenville *a*	77	34	58.7	6.64	
Greenville *b*	83	32	60.2	6.56	
Greenwood	81	29	58.5	5.97	
Hattiesburg	84	30	61.7	2.98	
Hazlehurst	86	28	61.5	3.75	
Hernando	78	32	58.4	.....	
Holly Springs	77	28	56.2	5.96	T.
Indianola	82	28	60.0	8.20	T.
Jackson	88	29	61.8	2.90	
Kosciusko	81	32	58.8	5.18	T
Lake	79	27	57.0	3.77	
Lake Como	83	36	58.2	3.28	
Laurel	84	30	60.3	3.75	
Leakesville	86	29	60.7	3.28	
Louisville	82	25	59.8	4.61	T.
Macon	80	28	56.4	3.86	T.
Magnolia	83	30	62.0	3.30	
Natchez	87	35	65.0	4.70	
Nittayuma	80	29	59.1	3.96	
Okolona	82	28	57.0	5.09	T.
Palo Alto	81	29	58.6	4.61	T.
Patmos	.....	.....	.....	4.96	
Pearlington	79	33	61.0	2.08	
Pittsboro	81	26	58.6	5.41	
Pontotoc	79	30	57.9	6.72	T.
Poplarville	85	31	63.5	3.43	
Port Gibson	85	29	62.4	3.69	
Ripley	78	26	56.4	5.15	0.5
Shoccoe	79	34	61.9	2.77	
Stonington [*i*]	.....	.....	.....	4.69	
Suffolk	84	30	62.4	5.37	
Swartwout	83	33	63.5	4.78	
Thornton	80	36	64.3	4.65	
Tupelo	82	27	57.9	5.88	
University	82	29	58.8	5.53	T.
Walnutgrove	81[e]	29[e]	59.4[e]	4.03	
Watervalley	84	32	59.9	5.85	T.
Waynesboro	78	28	58.4	2.21	
Woodville	79	36	62.6	5.25	
Yazoo City	85	31	60.4	3.99	
Missouri.					
Appleton City	77	24	50.3	4.06	
Arthur	80	23	52.2	3.57	
Avalon	75	25	49.6	3.07	T.
Bethany	72	22	44.7	3.12	0.8
Birchtree	80[e]	25[d]	54.4[e]	5.70	T.
Boonville	.....	.....	.....	3.44	T.
Brunswick	77	24	48.2	3.74	T.
Caruthersville	84	28	55.2	5.92	T.
Conception	74	24	45.4	1.51	T.
Darksville	77	25	49.6	2.84	0.2
Dean	83	19	52.9	4.64	
Desoto	83	24	53.5	3.32	T.
Downing	.....	.....	.....	3.52	3.0
Edgehill [*b*]	79	21	51.8	3.73	T.
Edwards	79	22	53.2	2.89	
Eightmile [*b*]	.....	19	45.2	2.08	
Fairport	.....	.....	.....	2.38	4.0
Fayette	79	27	51.6	3.11	T.
Fulton	78	22	51.4	2.76	T.
Gallatin [*i*]	73	25	45.9	2.69	1.0
Glasgow	78	25	49.4	2.46	0.5
Gorin	.....	.....	.....	3.35	T.
Grant City	72	19	44.3	2.69	1.0
Halfway	80	27	52.2	3.65	T.
Harrisonville	74	22	48.4	2.81	
Hazlehurst	.....	.....	.....	2.78	2.0
Hermann	.....	.....	.....	3.87	T.
Houston	79	25	52.3	4.90	T.
Huntsville	77[e]	25[e]	51.4[e]	3.19	T.
Ironton	83	20	52.0	3.28	T.
Jackson	84	25	52.9	5.71	0.2
Jefferson City	80[j]	25[g]	48.0[j]	2.37[f]	T.
Joplin	79	23	53.4	4.61	T.
Kidder	73	22	46.3	2.79	1.7
Koswkoning	81	26	53.4	5.87	T.
Lamar	79	23	52.8	4.54	T.
Lamonte	.....	.....	.....	2.49	T.
Lebanon	77	25	51.8	4.33	0.5
Lexington	77	24	49.6	2.51	
Liberty	73	21	47.0	2.71	T.
Louisiana	78	22	49.7	3.26	T.
Macon	77	25	49.0	3.61	T.
Marblehill	84	21	53.0	4.52	T.
Marshall	76	24	49.1	2.79	0.5
Maryville	73	18	41.6	2.23	1.1
Mexico	79	24	50.8	2.73	0.1
Miami [*b*]	75	27	48.2	3.63	T.
Monroe City	76	23	49.0	3.33	T.
Montreal	80	20	51.6	3.22	T.
Mountaingrove	78	24	50.8	6.06	T.
Mount Vernon	82	25	53.9	4.03	
Neosho	81	22	53.4	4.29	
Nevada	.....	.....	.....	3.95	
New Haven	80	26	53.4	3.73	T.
New Madrid *b*	.....	.....	.....	5.95	T.
New Palestine	77	25	52.0	3.64	0.2
Oakfield	77	26	52.0	3.99	0.5
Olden	81	26	52.4	6.21	T.
Oregon	73	18	45.0	2.89	1.4
Palmyra [*b*]	78	26	49.0	3.90	1.0
Phillipsburg	.....	.....	.....	3.85	0.5
Pine Hill	.....	.....	.....	2.19	0.2
Poplarbluff	83[e]	25[f]	54.6[f]	5.05	
Princeton	73	23	46.8	3.35	2.0
Richmond	.....	.....	.....	3.13	
Rockport	.....	.....	.....	3.02	
Rolla	.....	.....	.....	4.06	0.3
St. Charles	80	27	52.9	3.49	T.
St. Joseph	.....	.....	.....	2.60	0.4
Sarcoxie	.....	.....	.....	4.48	
Sedalia	77	25	50.6	2.87	T.
Seymour	79	24	50.6	4.41	T.
Shelbina	.....	.....	.....	3.58	T.
Sikeston	82	25	53.2	4.80	T.
Steffenville	76	25	48.8	3.05	0.5
Trenton	70	25	46.6	2.92	2.0
Unionville	72	22	44.2	3.85	3.0
Vichy	80	21	51.6	3.96	0.4
Warrensburg	74	26	49.8	2.17	
Warrenton	79	24	49.6	4.06	T.
Wheatland	.....	.....	.....	3.73	
Willowsprings	80	23	51.5	5.65	T.
Windsor	77	26	51.0	2.06	T.
Zeitonia	85	20	52.4	3.92	T.
Montana.					
Anaconda	60	6	30.5	0.79	5.5
Augusta	54	— 2	28.9	0.32	4.0
Boulder	58	1	30.2	1.25	10.5
Bozeman	57	10	31.2	1.11	
Butte	56	11	32.6	0.65	6.5
Canyon Ferry	60	10	30.6	0.43	
Columbia Falls	47	10	31.6	2.77	17.0
Crow Agency	62	8	33.6	0.15	1.5
Culbertson	61	4	27.2	0.53	5.5
Deerlodge	57	3	29.6	.....	
Dillon	61	2	30.7	1.21	7.8
Ekalaka	56	5	31.8	.....	
Fort Benton (*a*)	58	9	28.6	0.10	1.0
Fort Logan	55	—10	26.9	1.00	12.0
Glasgow	60	— 6	27.7	1.39	7.0
Glendive	62	5	30.0	1.00	10.0
Greatfalls	58	6	32.6	0.45	3.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Montana—Cont'd.	°	°	°	*Ins.*	*Ins.*
Hamilton	67	16	36.2	1.08	
Lewistown	58	−1	29.0	0.65	6.5
Manhattan	60	−3	30.0	0.70	6.0
Marysville	50	9	28.9	2.66	5.0
Missoula	52	15	34.6	1.94	1.0
Ovando	47	10	29.6	3.76	11.8
Plains	49	12	34.4	2.60	2.0
Poplar	60	3	28.7	0.65	6.5
Ridgelawn				1.39	8.2
Springbrook	59	5	28.6	0.67	6.4
St. Pauls	56	0	29.6	0.74	10.2
St. Peter	51	0	29.5	0.68	9.5
Toston	54	3	29.0	0.20	2.0
Townsend	59	3	30.8	0.60	5.5
Troy	50	11	33.2	5.91	14.0
Twin Bridges	62	3	29.6	0.70	3.0
Twodot	60	5	26.6	2.50	20.0
Utica	53[c]	2[c]	28.8[c]	2.04	15.0
Winston	53	7	26.8	0.30	4.0
Yale	55	1	27.9	0.94	6.0
Nebraska.					
Agate				0.40	2.5
Agee *1	64	14	34.4	0.15	
Albion				0.17	
Alma	74	10	42.2	T.	
Ames	70	13	41.0	1.48	2.0
Ansley	70	12	36.1	T.	T.
Arapahoe				0.20	T.
Arborville *1				0.51	1.5
Arcadia					T.
Ashland *a*	74	14	42.2	1.49	0.2
Ashland *b* *1				1.34	1.0
Ashton				0.17	T.
Auburn	79	16	44.6	2.57	1.0
Aurora	74	15	42.0	0.33	1.0
Bartley				0.09	
Beatrice	74	13	42.9	1.90	1.0
Beaver	69	12	41.2	0.04	T.
Bellevue				2.38	1.3
Benedict				0.77	2.0
Blair	72	12	39.6	1.40	1.5
Bluehill *1	69	18	42.7	0.37	T.
Bradshaw				1.03	0.5
Bridgeport	75	0	38.0	T.	T.
Brokenbow	71	9	37.7	0.00	
Burchard				2.96	1.0
Burwell				0.15	T.
Callaway	70	10	37.8	0.10	
Cedar Rapids	63	12	35.0	0.22	T.
Central City				0.45	0.5
Cody				0.18	
Columbus	64	14	39.4	0.47	0.5
Crete	73	16	41.8	1.33	1.3
Culbertson				0.10	T.
Dawson	76	11	45.8	2.76	
Edgar				0.57	0.4
Ericson				0.20	T.
Ewing				0.07	
Fairbury	76	11	41.3	1.36	1.0
Fairmont	73	13	39.6	1.18	2.5
Fort Robinson	74	8	33.5	0.25	2.0
Franklin	79	10	41.3	T.	
Fremont	72	11	38.9	1.25	1.0
Fullerton				0.45	1.0
Geneva	73	13	40.1	1.67	5.0
Genoa (near)	63	12	38.5	0.32	1.0
Gering	71	4	39.0	0.12	1.2
Gordon				0.35	1.0
Gosper				0.32	
Gothenburg	70	11	37.6	0.04	
Grand Island *b*	68	11	40.6	2.22	T.
Greeley				0.05	
Guide Rock				0.18	T.
Haigler				T.	
Hartington	65	4	37.3	0.70	T.
Harvard	70	9	39.6	0.28	0.7
Hastings *1	67	14	39.8	0.20	0.5
Hayes Center				T.	T.
Hay Springs	67	8	35.0	0.15	1.5
Hebron	69	15	42.8	1.32	1.0
Hickman				0.43	1.0
Holbrook				0.20	T.
Holdredge	66	15	39.9	T.	T.
Hooper *1	66	14	38.6	1.90	2.4
Imperial	75	8	39.4	0.12	T.
Kearney	67	15	41.4	0.03	
Kennedy	72	5	39.7	0.70	2.0
Kimball	70	5	35.0	0.20	2.0
Kirkwood *1	67[d]	12[d]	33.1[d]	0.36	1.0
Laclede	69	9	39.2	0.63	2.0
Lexington	69	11	37.4	0.15	T.
Loup	70	9	38.2	0.17	
Lynch	72	3	37.6	0.11	T.
Lyons				0.82	1.3
McCook	64	16	41.2	T.	
McCool Junction				1.15	
Madison	61	11	37.3	0.05	0.5
Madrid	68	10	38.6	0.20	2.0
Marquette				0.39	1.7
Mason				0.23	
Minden *b*	66	14	39.0	0.12	
Nebraska City *c*	75	16	44.6	1.92	1.0
Nemaha				2.65	T.
Norfolk	66	6	36.4	0.26	0.7
North Loup	69	9	38.5	T.	T.
Oakdale	65	7	35.7	0.09	0.2
Odell				3.50	1.0
O'Neill	68	10	37.8	0.18	
Ord	64	10	36.0	0.00	.....
Osceola				0.12	
Palmer				0.35	
Palmyra *1	74	12	40.7	2.38	1.0
Pawnee City				1.95	1.7
Plattsmouth *b*	73	10	41.0	1.52	
Purdum	71	9	38.8	0.35	0.3
Ravenna *a*	67	11	38.8	0.17	T.
Redcloud	77	14	40.9	0.72	T.
Republican *1	68	12	39.8	.....	
Rulo				2.17	0.2
St. Libory				0.15	T.
St. Paul	66	12	40.6	0.20	T.
Salem *1	66	18	43.8	1.64	1.0
Santee	62	9	37.9	0.20	6.2
Schuyler				0.05	1.0
Seward	72	12	40.4	1.34	0.8
Smithfield				0.25	
Spragg				0.79	T.
Stanton	63	7	38.6	0.38	2.0
Strang *1	70	18	41.9	2.10	1.0
Stratton				0.17	
Superior	75	2	39.1	0.68	
Syracuse				3.10	1.0
Tablerock				1.35	2.0
Tecumseh *b*	74	18	44.0	1.88	2.0
Tekamah	72	3	40.2	1.62	3.0
Turlington	72	15	42.0	2.92	2.0
University Farm	74	12	42.2	2.30	2.0
Wakefield	63	5	37.6	0.46	0.8
Weeping Water	70	8	39.4	1.90	2.0
Westpoint	68	10	39.1	0.61	1.1
Wilber *1	72	14	40.8	1.25	1.0
Wilsonville				T.	T.
Winnebago				0.97	T.
Wisner				0.24	0.5
Wymore				2.70	1.5
York	69	12	40.9	1.07	0.5
Nevada.					
Austin	59	12	33.6	1.26	
Battle Mountain	74	7	39.4	0.70	3.2
Beowawe *1	72	18	39.3	0.70	2.0
Belmont	60	9	30.0	1.01	6.5
Butler	62	15	36.5	0.70	7.0
Candelaria	69	19	38.8	1.40	7.2
Carlin					3.0
Carson City	66	16	39.1	1.02	2.1
Cranes Ranch				0.96	
Ely	63	1	32.0	2.40	15.0
Eureka	60	7	33.3	1.10	11.0
Fenelon *1	48	9	30.8	0.65	2.5
Golconda *1	65	19	35.1	0.45	1.0
Halleck *1	65	5	34.0	0.47	2.8
Hawthorne	68	19	41.9	0.70	2.0
Humboldt	67	10	38.8	0.95	1.2
Lewers Ranch	64	16	39.4	3.90	2.0
Lovelocks	75	29	49.8	0.55	
Martins	68	14	39.8	1.30	.....
Mill City *1	70	27	43.9	0.20	2.0
Monitor Mill	60	0	30.4	2.04	12.0
Morey	65	8	34.1	3.13	18.0
Palisade	78[f]	11	39.8	0.45	
Palmetto	64	1	32.6	3.83	32.5
Potts	64	−3	34.4	1.74	12.8
Reno State University	65	13	38.8	0.50	1.0
Rioville	82	30	54.0	1.33	
Sodaville	65	17	39.3	0.74	4.0
Tecoma	61	5	32.8	0.47	2.0
Toano *1	58	12	32.9	0.79	2.0
Wabuska	72	9	36.5	0.15	1.5
Wadsworth	71	14	40.8	0.40	
Wells	55	18	34.5	0.60	6.0
Wood	63	7	34.4	0.72	
New Hampshire.					
Alstead	61	16	39.6	1.24	2.2
Berlin Mills	68	6	37.3	0.86	2.0
Bethlehem	62	10	37.6	1.54	4.5
Brookline *1	64	16	40.3	0.90	5.0
Chatham	63	12	37.2	1.28	3.0
Concord	65	18	40.1	0.98	0.5
Durham	68	21	41.8	0.79	0.8
Franklin Falls	63	21	40.2	1.30	0.5
Grafton	67	14	38.8	1.01	0.5
Hanover	56	11	39.0	1.16	0.8
Keene	64	13	40.5	0.82	1.5
Littleton	62	10	35.6	1.97	6.5
Manchester				0.87	T.
Nashua	66	22	41.8	5.77	2.8
Newton	67	19	41.4	0.86	1.0
North Stratford				1.15	5.5
Peterboro	66	15	41.3	0.99	.....
Plymouth	61	18	38.2	1.16	0.3
Sanbornton	66	19	39.3	1.30	1.0
Sewalls Falls				0.82	T.
Stratford	64[f]	5[f]	39.3[f]	1.87	7.0
West Stewartstown				1.95	4.7
New Jersey.					
Asbury Park	74	27	52.2	3.08	
Barnegat [f]	78	31	52.5	14.7	
Bayonne	70	27	48.9	1.39	.....
Belvidere	74	25	47.6	1.65	.....
Bergen Point	69	29	49.2	1.61	.....
Beverly	79	26	50.2	2.41	
Blairstown	71	23	46.0	0.97	
Bridgeton	80	29	51.8	4.17	
Camden	73	29	51.1	2.20	
Canton				3.18	
Cape May C. H.	76	29	52.3	4.11	.....
Charlotteburg	71	20	46.1	1.30	2.0
Chester	74	25	46.5	1.83	3.5
Clayton	77	26	50.8	3.16	
College Farm	70	24	49.0	1.58	
Culvers Lake				0.93	
Dover	70	25	45.2	1.29	1.0
Egg Harbor City	75	25	50.6	3.53	
Elizabeth	69	27	48.7	1.35	
Englewood	69	30	49.6	1.51	0.5
Flemington	73	26	48.6	1.27	
Freehold	71	25	48.6	2.48	
Friesburg	76	25	51.0	3.28	
Hightstown	70	27	49.8	2.29	
Imlaystown	72	27	50.4	2.46	
Indian Mills	79	24	51.4	3.31	
Lakewood	75	25	50.3	2.47	
Lambertville	76	27	49.6	1.60	.....
Layton	72	23	45.2	0.88	
Moorestown	76	27	50.4	2.50	
Mount Pleasant				3.37	
Newark	72	28	48.4	1.12	T.
New Brunswick	70	25	49.2	1.66	T.
New Egypt				2.50	
Newton	72	23	46.2	1.43	2.0
Oceanic	73	30	50.8	2.74	
Paterson	70	28	49.9	1.09	T.
Pemberton	74	29	49.6	2.68	
Perth Amboy	68	26	49.6	1.68	
Piscataway				1.49	
Plainfield	72	24	47.0	1.50	T.
Rancocas				2.55	
Ringwood	70	20	47.0	0.81	
Rivervale	68	19	46.2	1.46	
Roseland				1.08	0.8
Salem	78	27	51.6	3.30	
Somerville	72	23	48.0	1.41	.....
South Orange	67	27	46.6	1.24	T.
Sussex	72	22	46.2	0.87	
Three Bridges				1.65	
Toms River	77	23	50.2	3.52	
Trenton	71	34	52.0	1.99	
Tuckerton	75	25	51.2	3.96	
Vineland	77	25	50.6	3.72	
Woodbine	76	25	50.4	3.50	
Woodstown				3.16	
New Mexico.					
Alamagordo	77[e]	18[e]	47.4[e]	0.15	T.
Albert	81	19	46.8	0.84	1.0
Albuquerque	70	15	44.4	1.10	
Arabella	77	18	47.0	0.45	T.
Bellranch				0.54	0.5
Bluewater	69	2	36.4	0.30	
Cambray				0.60	2.0
Carlsbad	93[d]	14[d]	54.6[d]	0.57	2.7
Cloudcroft	57	4	34.6	1.31	13.0
Deming				0.27	
Dorsey	76	10	40.2	0.85	2.0
East View	69	8	38.0	1.76	T.
Espanola	67	12	41.0	0.87	
Folsom	72	7	38.8	0.39	0.2
Fort Bayard	70	18	44.4	0.83	
Fort Stanton	70	5	40.7	0.16	1.6
Fort Union	75	10	41.1	0.58	0.5
Fort Wingate	68	11	40.8	1.27	7.1
Gage				0.52	
Gallinas Spring	74	13	45.6	0.33	0.5
Las Vegas	73	9	40.2	0.79	2.2
Las Vegas Hot Springs	73	11	41.8	1.21	3.3
Lordsburg				0.52	
Mesilla Park	80	13	49.0	0.61	4.5
Raton	74	18	44.6	0.11	
Roswell	82	16	49.5	0.52	1.2
Taos	67	12	40.8	2.00	
Winsors Ranch	66	2	34.4	1.47	
New York.					
Adams				1.35	3.0
Addison	74	19	45.8	0.89	0.5
Adirondack Lodge	58	6	37.2	4.08	10.

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.)			Precipitation.	
	Maximum.	Minimum.	Mean.	Rain and melted snow.	Total depth of snow.
New York—Cont'd.	°	°	°	*Ins.*	*Ins.*
Akron				1.15	
Alden	70	18	45.6	1.32	3.5
Angelica	72	14	43.4	0.79	0.5
Appleton	71	23	45.8	1.66	T.
Amsterdam				1.11	
Arcade	69	6	42.2	1.97	1.0
Athens	66	21	44.4	1.11	T.
Atlanta	71	12	43.0	1.39	4.5
Auburn	72	19	45.8	1.94	2.0
Avon	73	15	44.9	1.25	7.0
Axton	65	8	42.2		
Baldwinsville	68	21	44.7	2.10	3.5
Bedford	68	39	47.6	2.02	T.
Blue Mountain Lake				2.15	3.0
Bolivar	70	13	42.8	1.56	1.9
Bouckville	67	12	42.5	1.53	4.0
Boyds Corner				0.91	
Brockport	70	19	45.0	1.52	0.4
Caldwell	64	16	41.4	1.76	5.2
Canaan Four Corners	65	15	42.3	0.90	T.
Canajoharie	69	9	41.6	1.08	2.3
Canton	70	4	40.5	1.29	3.0
Carmel	65	23	46.4	0.89	
Carvers Falls	64	15	40.2	1.24	2.0
Cedarhill	66	18	43.2	0.89	0.6
Cooperstown	66	13	41.4	1.48	3.0
Cortland	70	15[c]	44.7	1.07	
Cutchogue	69	27	48.6	1.66	
Dekalb Junction				1.66	4.0
Easton				1.20	
Elba	70	18	43.5	0.85	T.
Elmira	75	20	46.3	0.88	1.5
Fayetteville	73	15	45.7	1.72	6.0
Franklinville	69	9	44.0	1.65	T.
Gansevoort				1.22	0.5
Glens Falls	63	16	42.0	0.89	0.5
Gloversville	65	15	40.6	1.62	0.5
Greenwich	69	17	41.7	1.24	T.
Griffin Corners	69	11	41.9	0.99	0.6
Harkness	69	14	41.6	1.57	4.9
Haskinville				1.37	0.7
Hemlock	69	25	46.0	1.21	3.5
Honeymead Brook	66	20	43.6	0.60	T.
Indian Lake	68	4	38.6	1.77	2.4
Ithaca	71	19	44.9	0.99	1.1
Jamestown	70	20	44.6	1.57	0.5
Keene Valley	71	6	40.7	2.12	5.1
King Ferry				1.34	0.7
Liberty	67	20	42.3	0.55	T.
Littlefalls, City Res.	64	15	41.3	1.74	3.0
Lockport	68	21	45.8	1.56	2.5
Lowville	62	6	39.8	2.57	3.2
Lyons	70[c]	23[c]	46.9[c]	1.53	1.0
Middletown	63	25	45.8	0.85	T.
Mohonk Lake	62	21	44.0	1.17	
Moira	73[1]	12	42.3[d]	1.26	0.2
Mount Etrick	77	23	44.6	1.63	4.0
Newark Valley				1.26	4.0
New Lisbon	67	7	40.4	1.12	3.0
North Hammond	60	24	41.2	1.37	2.0
Number Four	67	6	40.0	4.36	6.0
Nunda	73	17	46.3	1.60	3.0
Ogdensburg	62	12	40.6	0.95	1.0
Oneonta	72	15	43.8	1.11	3.0
Otto	69	18	45.0	1.74	
Oxford	68	14	43.6	1.25	0.8
Palermo				0.80	
Penn Yan	72	25	45.4	0.87	
Perry City	70	15	43.6	1.20	1.8
Plattsburg	63	14	40.4	0.87	3.2
Port Jervis	71	20	45.2	1.29	
Primrose	69	22	45.2	0.63	0.5
Redhook				1.35	
Richmondville	70[d]	16[d]	42.7[d]	1.05	1.5
Ridgeway	68	23	45.2	1.70	8.3
Rome	65	15	42.8	2.20	
Romulus	74	23	45.7	1.71	4.0
Saranac Lake	70	6	39.4	1.93	5.5
Saratoga				1.34	0.5
Setauket	68	32	48.8	1.63	
Shortsville	72	21	46.4	1.05	4.3
Skaneateles				2.12	
Southampton	63	28	48.6	1.63	T.
South Canisteo	74	15[c]	43.0	1.41	4.5
Southeast Reservoir				1.17	
South Kortright	69	12	42.8	0.81	1.0
South Schroon	64	11	39.2	1.77	3.7
Speer Falls	66	17	41.9	0.92	T.
Straits Corners	73	14	43.6	0.50	4.2
Ticonderoga	65	14	42.2	1.18	0.5
Volusia	70	22	44.4	0.78	6.0
Walton	71	15	43.6	0.91	0.8
Wappinger Falls	68	19	43.0	1.37	1.0
Warwick				0.73	
Watertown	67	12	42.8	1.99	3.0
Waverly	74	18	44.7	1.05	2.0
Wedgwood	73	20	44.4	1.24	2.0
Wells	69	7	40.6	1.38	1.8
West Berne	76	13	42.2	1.23	3.0
Westfield *e*	66	28	45.8	1.62	T.
Windham	69	12	42.1	0.88	0.5
Wolcott	72	13	44.0	1.97	1.5
Youngstown				1.74	
North Carolina.					
Brevard	78	19	51.0	3.81	T.
Brewers	81	23	53.8	2.62	T.
Bryson City				4.35	T.
Chapelhill	81	30	56.2	2.94	
Cranberry	65	22	49.2	1.15	1.3
Currituck				4.75	
Edenton	78	35	58.6	6.95	
Fayetteville	82	29	57.5	3.28	
Goldsboro	76	32	55.2	2.81	
Graham				2.50	
Greensboro	75	30	55.0	3.08	
Henderson	78	30	55.4	3.77	
Hendersonville	79	24	52.4	3.46	T.
Henrietta	80	25	55.6	3.20	
Highlands	69	14	44.9	6.18	0.5
Horse Cove	71	22	52.2	5.80	0.1
Hot Springs	75	32	54.4		
Kinston	81	31	57.2	4.14	
Kittyhawk	73	40	59.2	5.73	
Lenoir	79	26	53.1	4.11	
Lexington	74	28	55.0	4.83	
Linville	65	18	43.3	3.64	1.0
Littleton	80	27	54.4	2.80	
Louisburg	76	29	55.0	3.94	
Lumberton	75	32	56.6	4.34	
Marion	80	26	54.7	4.60	T.
Marshall	72[1]	28[1]	50.3[h]	2.81	T.
Mocksville	79	26	52.2	5.35	T.
Moncure	81	22	55.2	2.79	
Monroe	79	23	54.2	4.50	T.
Morganton	77	26	53.6	3.83	
Mountairy	75	24	52.2	4.27	
Murphy				4.47	
Newbern	80	32	58.1	3.77	
Patterson *e* [1]	71	26	48.4	4.12	
Penelo	80	31	55.9	3.38	
Pittsboro	88	27	56.8	3.46	
Reidsville	80	28	56.4	2.73	
Rockingham	82	29	57.7	5.51	
Roxboro	78	29	53.6	3.84	
Salem	76	27	51.2	4.64	
Salisbury	85	30	56.0	2.96	T.
Saxon	76	24	53.1	4.62	
Selma	80	29	55.8	2.35	
Settle	78	28	53.6	5.22	T.
Sloan	81	33	59.0	7.28	
Soapstone Mount	77	25	53.4	5.15	T.
Southern Pines *a*	80	29	58.2	4.40	
Southern Pines *b*	78	30	58.4	3.99	
Southport	83	31	62.4	3.50	
Springhope [1]	84	32	57.8	3.51	
Statesville	81	26	54.7	4.54	T.
Tarboro	87	32	57.4	3.35	
Washington	82	35	59.7	5.09	
Waynesville	80	25	54.2	3.36	T.
Weldon *a*	78	32	54.0	3.29	
Weldon *b*				3.16	
North Dakota.					
Amenia	59[1]	0[1]	26.6[1]	0.34	2.0
Ashley	58	— 5	27.2	0.20	2.0
Berlin	69	0	29.2	0.12	1.0
Bottineau	59	4	22.0	0.30	3.0
Buxton	56	1	28.8	0.23	
Churchs Ferry	61	0	24.6	0.16	1.6
Coalharbor	62	3	29.6	0.10	1.0
Devils Lake	69	1	29.3	T.	T.
Donnybrook				0.38	3.5
Edgeley	69	2	30.0	0.14	1.5
Ellendale	69	5	31.0	0.40	4.0
Fargo	55	0	27.8	0.19	1.1
Forman	50	3	25.8	0.37	5.0
Fort Yates	68	11	32.0	0.05	0.5
Fullerton	58	3	29.2	0.26	1.9
Gallatin	58	— 4	26.2	0.15	1.5
Glenullin	69	6	30.8	T.	T.
Grafton	58	— 2	25.0	0.38	3.8
Hamilton	69	2	28.8	0.54	4.2
Hannaford	57	— 2	28.2	0.26	1.2
Jamestown	69	9	29.4	0.20	1.2
Larimore	67	— 3	26.0	0.30	3.0
McKinney	69[c]	— 9[c]	24.8[c]		2.5
Mayville	69	2	29.0	T.	T.
Medora	59	4	31.2	0.40	4.0
Melville	65[c]	4[c]	29.3[c]	0.13	1.3
Milton	58	—12	21.8	0.26	2.0
Minot	60	— 1	29.8	0.05	0.5
Minto	59	— 4	26.2	0.16	1.6
Napoleon	56	— 1	27.8	0.10	1.0
New England	56	0	28.8	0.15	1.5
Oakdale	58	3	30.0	0.55	5.5
Pembina	64	— 8	23.6	0.49	3.9
Portal	58	— 7	24.7	0.40	4.0
Power	61	2	29.6	0.25	2.5
Steele	57	1	28.1	T.	T.
University	56	2	26.6	0.32	1.3
Wahpeton	58	— 8	31.1	0.51	2.5
Willow City	60	—10	24.9	0.02	0.2
Woodbridge	57	— 9	23.2	0.65	
Ohio.					
Akron	72	24	46.8	2.24	0.7
Atwater	68	26	46.1	1.58	0.2
Bangorville	74	18	46.5	2.35	1.5
Bellefontaine	69	25	47.3	2.59	1.0
Bement	72	39	48.7	2.26	1.5
Benton Ridge	72	25	48.6	2.09	6.4
Bethany	77	28	51.3	3.36	
Binola				1.90	1.0
Blaine				2.56	4.0
Bowling Green	76	22	47.8	2.35	5.5
Bucyrus	72	25	47.9	2.25	
Cambridge	75	25	48.7	2.25	1.0
Camp Dennison	76	28	50.1	3.34	T.
Canal Dover	71	24	46.4	2.09	T.
Canton	70	24	46.6	1.85	0.3
Cardington	73	25	47.8	1.94	2.0
Cedarville				3.05	0.5
Centerburg				3.27	2.0
Circleville	75	28	50.0	3.27	1.5
Clarksville	76	30	51.6	3.81	0.5
Cleveland *a*	71	28	49.3	2.69	2.0
Cleveland *b*	73	27	48.2	1.63	
Clifton	73	22	50.6	3.13	1.0
Coalton	78	25	50.2	2.76	T
Coolville				2.34	T
Coshocton				2.24	0.5
Dayton *a*				3.48	T.
Dayton *b*	75	28	49.8	3.56	T.
Defiance	75	24	47.8	2.76	6.7
Delaware	74	27	48.2	2.49	T.
Demos	70	25	49.4	3.08	
Dunham				2.23	2.0
Dunkirk				2.68	3.0
Elyria	75	26	47.7	2.20	
Findlay	76	24	48.9	2.65	3.0
Fort Recovery				2.55	0.4
Frankfort	73	26	49.2	2.42	2.0
Fremont	75	24	48.8	2.06	3.0
Galigher				2.21	3.0
Garrettsville	73	21	46.6	2.43	T.
Granville	74	27	48.4	3.33	T.
Gratiot	72	26	48.6	3.07	2.2
Green	78	30	51.8	3.70	T.
Greenfield	73	29	50.3	2.90	0.1
Greenhill	72	19	45.5	1.67	0.5
Greenville	72	26	50.0	3.84	2.0
Hanging Rock	79	29	52.2	2.79	
Hedges	74	23	47.8	2.41	4.0
Hillhouse	72	17	45.8	1.96	1.5
Hiram	70	24	46.4	2.51	3.0
Hudson	70	22	45.7	2.09	1.0
Jacksonboro	76	25	49.6	3.51	2.0
Killbuck	72	25	46.2	2.61	
Lancaster	74	24	49.7	3.56	3.0
Lima	78	23	48.5	2.18	5.2
McConnellsville	77	24	49.6	2.53	2.0
McCormack				2.65	1.6
Manara	72	24	48.0	2.57	1.2
Mansfield				2.79	0.2
Marietta	73	30	51.5	3.08	0.5
Marion	75	24	48.8	2.73	0.1
Medina	73	23	47.4	2.09	1.0
Milfordton	72	24	46.6	2.78	T.
Milligan	75	23	48.4	2.26	1.0
Millport	71	20	45.2	1.79	T.
Montpelier	71	24	45.5	2.83	6.0
Napoleon	73	28	49.0	2.28	7.0
New Alexandria	78	26	49.6	1.50	2.0
New Berlin	87	23	44.6	2.07	
New Bremen	76	20	48.4	2.78	4.0
New Lexington				3.63	1.8
New Richmond	78	29	52.6	3.50	
New Waterford	69	21	46.3	1.84	1.0
North Lewisburg	73	25	48.4	2.55	1.0
North Royalton	72	24	47.5	2.11	3.0
Norwalk	75	21	48.1	2.29	4.5
Oberlin	74	23	47.8	2.33	
Ohio State University	72	27	48.4	2.67	0.1
Orangeville	72	21	45.4	1.40	T.
Ottawa	73	24	47.8	2.55	
Pataskala	73	24	48.1	3.50	2.5
Philo	74	27	50.8	2.85	1.8
Plattsburg	72	26	48.8	3.17	
Pomeroy	76	28	50.6	2.03	0.8
Portsmouth *a*				3.06	T.
Portsmouth *b*	77	30	52.2	3.13	T.
Pulse				3.25	
Redlion				3.77	
Richfield				2.15	1.0
Richwood	75	27	48.9	2.18	T.
Ripley	75	28	50.8	3.48	T.

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Ohio—Cont'd.	°	°	°	*Ins.*	*Ins.*
Rittman	75	23	46.7	3.19	T.
Rockyridge	74	21	48.3	2.35	3.2
Shenandoah	71	23	46.4	2.58	3.2
Sidney	75	26	49.4	3.13	4.0
Somerset	73	28	51.4	4.01	1.8
Springfield				3.76	
Strongsville				2.35	
Swanton				2.14	
Thurman	85	27	52.4	2.60	T.
Tiffin	73	26	48.6	2.31	1.5
Upper Sandusky	72	25	49.0	2.45	4.0
Urbana	70	24	46.0	2.59	1.3
Vanwert	69	20	47.2	.....	2.5
Vickery	74	23	48.2	1.88	2.6
Wadsworth				2.48	
Walnut				3.70	1.9
Warren	75	23	47.0	1.84	0.5
Warsaw	74	23	46.5	3.03	
Wauseon	76	30	47.4	2.37	5.8
Waverly	80	27	50.9	3.00	1.5
Waynesville	74	28	48.6	2.19	T.
Wellington	73	23	47.6	2.29	1.0
Williamstown				2.40	.....
Willoughby				2.26	
Wooster	72	24	47.4	2.62	1.0
Zanesville				2.62	
Oklahoma.					
Ames	76	20[c]	51.3	2.85	
Burnett	79	25	54.4	7.39	
Chandler	82	23	55.4	4.61	
Cleo	81	19	50.8	1.49	
Clifton	80	21	56.0	5.02	
Cloud Chief	79	24	52.4	5.31	
Fort Reno	78	23	52.5	7.30	
Fort Sill	76	23	53.8	6.35	
Guthrie	75	30	56.5	6.30	
Hennessey	78	21	50.0	2.50	
Jefferson	82	19	51.1	1.45	
Jenkins	82	21	50.4	1.93	
Kenton	79	12	45.1	0.29	T.
Kingfisher	77	24	52.4	3.28	
Mangum	77	24	53.8	3.65	
Newkirk	77	22	52.1	2.39	
Norman	76	25	53.3	7.00	
Pawhuska	78	21	53.2	5.78	
Perry	78	23	52.8	4.18	
Sac and Fox Agency	80	28	55.4	5.22	
Stillwater	77	25	53.9	7.78	
Taloga	79	24	51.3	2.38	
Ural	77	27	52.2	2.70	
Watonga	84	40	66.0	3.50	
Waukomis	80	19	51.4	2.30	
Oregon.					
Albany *b*				9.41	
Alpha	59	28	45.0	23.72	
Arlington	60	26	42.8	1.96	
Ashland	63	23	42.8	3.27	1.0
Aurora *1	55	30	45.2	8.92	
Aurora (near)	60	29	44.2	10.04	
Bay City	61	30	46.5	23.18	
Bend	60	11	36.1	2.09	T.
Beulah	63	9	35.2	2.21	3.5
Blackbutte	60	29	43.0	13.80	
Blalock	59	29	44.5	2.18	T.
Brownsville *1	60	30	48.2	8.04	
Bullrun				17.38	
Cascade Locks	53	31	43.6	21.01	
Comstock *1	60	34	43.6	12.45	
Coquille				13.93	
Corvallis	64	28	44.2	11.23	
Dayville	66	20	41.6	2.05	1.5
Doraville	53	30	41.8	10.79	0.5
Ella				1.48	T.
Eugene	61	31	45.8	10.69	
Fairview	63	29	47.8	18.47	
Falls City	53	29	42.6	21.15	
Forestgrove	59	26	43.8	13.59	
Gardiner	63	32	50.8	18.42	
Glenora	54	28	42.2	31.54	
Grants Pass	61	25	43.5	7.95	
Grass Valley	57	21	38.4	2.19	T.
Heppner	65	25	42.4	2.02	0.2
Hood River (near)	55	26	41.4	9.49	T.
Huntington	62	17	39.7	1.86	
Jacksonville	61	25	41.2	6.70	0.8
Joseph	55	11	32.4	2.86	11.0
Junction City *1	63	30	47.4	9.65	
Kerby	62	26	42.9	18.20	
Klamath Falls	60	14	38.4	0.79	T.
Lafayette *1	58	30	44.5	8.04	
Lagrande	60	21	38.2	3.46	6.2
Lakeview	55	16	31.3	2.20	1.7
Lonerock	63	19	39.4	3.56	2.5
McKenzie Bridge	61	23	40.8	16.11	3.0
McMinnville	56	27	44.4	13.14	
Merlin	69	28	44.8	8.61	T.
Monmouth *b *1	60	28	43.4	10.52	
Monroe	58	27	44.4	13.13	
Mount Angel	59	31	44.4	11.70	
Nehalem				23.31	
Newberg	58	28	43.8	11.84	
Newport	62	34	48.4	15.09	
Pendleton	65	21	43.0	2.58	
Pine	70	12	38.3	3.19	6.5
Prineville	76	16	42.5	1.56	T.
Riddles *1	58	34	46.0	8.22	
Riverside	70	11	38.6	1.01	1.0
Salem *b*	60	20	44.0	7.98	
Sheridan *1	60	30	48.0	11.58	
Silverton	68	30	49.6	9.38	
Siskiyou *1	56	28	40.7	6.17	10.5
Sparta	57	11	35.4	4.40	24.0
Springfield	50	32	41.9	4.92	
The Dalles	56	26	43.0	3.53	
Toledo	66	29	48.0	16.77	
Umatilla	60	25	43.8	1.69	
Vale	64	13	38.0	1.62	2.0
Wamic	57	20	40.0	3.19	1.2
Warm Spring	64	19	41.8	1.02	
Weston	58	19	38.6	5.87	6.5
Williams	69	25	44.8	8.60	T.
Pennsylvania.					
Aleppo	73	22	49.7	3.02	1.0
Altoona	71[c]	20[c]	45.6[c]	1.05	2.0
Athens	73[c]	19[c]	44.5[c]	1.11	2.0
Beaver Dam				1.54	.....
Bellefonte	74	23	48.8	1.87	0.5
Brookville				1.70	T.
Browers				2.11	T.
California	77	23	51.5	1.84	0.7
Cassandra	67	19	45.0	1.36	6.0
Centerhall	78	15	47.3	0.80	2.0
Clarion				1.82	T.
Coatesville	78	25	49.4	2.28	.....
Confluence				1.65	3.0
Davis Island Dam				1.18	.....
Derry Station	71	21	48.1	1.30	2.0
Doylestown				1.59	
Driftwood				0.92	.....
Dushore	67	17	41.8	1.20	3.5
Dyberry	74	18	43.2	1.23	3.0
East Bloomsburg				1.32	
East Mauch Chunk	74	23	46.2	1.56	1.0
Easton	67	26	47.4	1.26	T.
Ellwood Junction				1.12	T.
Emporium	69	20	45.2	1.72	3.0
Ephrata	75	23	49.2	2.20	1.0
Everett	73[c]	11[c]	46.4[c]	1.71	2.5
Forks of Neshaminy				1.75	
Franklin	72	20	47.0	1.95	T.
Freeport				1.33	.....
Girardville				1.90	8.2
Greensboro				1.45	T.
Hamburg	71	25	47.6	0.51	
Hamlinton	69	17	43.0	1.91	3.8
Herrs Island Dam				1.03	.....
Huntingdon *a*				1.04	.....
Huntingdon *b*	78	22	50.0	0.96	.....
Irwin	75	21	48.6	1.29	2.0
Johnstown	72	20	49.7	1.69	4.0
Kennett Square	71	26	49.8	2.35	
Lansdale				1.63	
Lawrenceville	75	9	44.2	1.19	2.0
Lebanon	74[c]	24[c]	48.2[c]	1.45	0.5
Leroy	71	20	44.8	0.90	2.0
Lewisburg	74	23	46.7	1.80	5.2
Lockhaven *a*	74	22	47.8	1.06	.....
Lockhaven *b*				1.21	.....
Lock No. 4				1.14	T.
Lycippus	72	23	50.3	1.62	4.1
Mifflin				1.61	.....
Oil City				1.78	
Ottsville				1.61	
Parker				1.35	T.
Philadelphia	75	32	51.4	2.19	
Pocono Lake	67	16	43.0	0.70	
Point Pleasant				1.66	
Pottsville				1.61	
Quakertown	76	24	48.6	1.70	T.
Reading				1.76	.....
Renovo *a*	72	23	47.2	0.89	1.5
Renovo *b*				0.79	.....
Saegerstown	72	19	46.4	2.03	
St. Marys	66	17	42.7	0.55	2.0
Saltsburg				1.00	.....
Seisholtzville				1.74	
Selinsgrove	75	24	48.2	1.54	4.0
Shawmont				1.75	
Smethport	70	16	43.6	1.75	2.0
Smiths Corners				1.72	
South Bethlehem	71	26	48.8	1.64	0.5
South Eaton	72	20	45.6	1.00	
Spring Mount				2.13	
State College	71	23	46.0	1.44	4.0
Swathmore	72	29	48.9	2.00	
Towanda	72	19	44.5	1.11	3.0
Troutrun				1.19	
Uniontown	71	29	51.4	1.59	1.5
Warren	69	21	45.4	1.40	1.0
Wellsboro	72	20	45.8	0.50	T.
Westchester	75	27	50.2	2.60	
West Newton				1.27	
Wilkesbarre	71	24	45.8	1.14	4.0
Williamsport	72	25	47.4	1.31	3.0
York	76	24	49.6	2.39	2.0
Rhode Island.					
Kingston	70	20	44.8	2.12	
Pawtucket	71	28	47.6	1.18	
Providence *a*	68	27	46.8	1.80	T.
Providence *c*	68	28	45.5	1.99	T.
South Carolina.					
Aiken	84	26	60.6	3.70	
Allendale	79	30	60.6	2.25	
Anderson	81	27	58.2	3.33	
Batesburg	77	26	58.0	4.08	T.
Beaufort	86	35	64.0	4.77	
Bennettsville	82	28	59.4	4.94	
Blackville	83	28	60.2	2.25	
Bowman	82	27	60.0	3.21	T.
Calhoun Falls				1.70	
Camden				2.95	
Cheraw *a*	79	28	57.0	3.48	
Cheraw *b*				3.67	
Clemson College	80	24	54.8	4.43	
Conway	82	31	59.6	3.94	
Darlington	81	28	58.8	5.46	
Duewest	76	26	59.8	2.58	
Effingham				3.44	
Florence	79	31	59.2	4.38	
Gaffney	82	27	56.8	1.88	T.
Georgetown	80	31	60.2	5.40	
Gillisonville	79	29	60.8	3.53	
Greenville	78	22	53.7	2.39	T.
Greenwood	80	26	56.8	3.60	
Heath Springs	78	25	55.0	3.55	
Kingstree *b*				2.33	
Liberty	78	24	55.8	3.75	T.
Little Mountain	77	28	58.8	2.91	T.
Longshore	80	26	58.0	4.09	0.2
Lugoff	81	27	58.8	4.33	T.
Pinopolis *1	78	35	62.1	5.09	
St. Stephens				3.81	
Saluda	79	26	57.6	3.38	T.
Santuck	78	25	55.8	4.47	T.
Seivern	89	24	60.2	3.21	
Smiths Mills				4.70	
Society Hill	75	32	57.8	5.27	T.
Spartanburg	79	27	55.8	3.33	T.
Statesburg	80	29	60.6	4.47	
Summerville	79	29	60.6	7.01	
Sumter	78	29	57.8	3.52	
Temperance	76	32	58.2	6.62	
Trenton	76	27	59.6	4.65	T.
Trial	83	35	63.7	3.85	
Winnsboro	78	27	58.6	3.26	
Winthrop College	77	27	57.8	3.76	T.
Yorkville	81	29	59.6	5.99	T.
South Dakota.					
Aberdeen	65	7	33.2	0.85	1.0
Academy	69	10	36.4	0.78	2.2
Alexandria	62	5	36.6	0.45	T.
Armour	68	4	35.9	0.27	0.7
Ashcroft	61	−1	32.6	T.	T.
Bowdle	62	6	28.6	0.20	2.0
Brookings	58	5	33.0	0.96	T.
Canton	65	10	36.8	0.81	T.
Centerville				0.61	0.8
Chamberlain	69	9	37.0	0.45	3.5
Clark	61	6	32.0	0.60	2.0
Desmet	57	7	31.4	0.33	T.
Doland	64	4	32.2	0.47	1.0
Elkpoint	68	9	37.6	0.33	0.6
Farmingdale				0.26	1.5
Faulkton	63	7	31.0	0.30	2.8
Flandreau	57	5	33.4	0.70	0.3
Forestburg	63	6	34.0	0.18	T.
Fort Meade	75	8	36.2	0.01	0.1
Gannvalley	67	9	35.4	0.41	0.5
Gary	69	8	30.8	1.05	
Gettysburg	77	11	29.2	0.02	0.2
Grand River School	63	1	31.9	0.01	0.3
Greenwood	69	10	39.4	0.30	1.2
Hotch City	68	5	36.5	0.51	0.5
Howard	55	18	32.8	.....	
Howell	67	4	31.2	0.45	0.8
Ipswich	62	4	31.2	0.19	0.5
Kimball	67	6	35.3	0.44	2.0
Leola	55[b]	−5[b]	25.4[b]	0.35	2.0
Leslie	66	2	33.4	0.05	0.5
Marion	61[b]	9[b]	34.4[b]	0.15	T.
Mellette	63	7	32.7	0.45	2.5
Menno	65	4	36.5	0.20	0.7
Millbank	60	5	33.6	1.04	1.5
Mitchell	62	4	35.0	0.55	T.

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
South Dakota—Cont'd.	°	°	°	*Ins.*	*Ins.*
Delrichs	68	1	33.6	0.22	T.
Pedro	71	10	35.6	0.20	2.0
Pine Ridge	71	7	37.8	0.08	T.
Plankinton	66	9	36.4	0.52	0.2
Ramsey	58	5	32.8	0.28	T.
Redfield	65	4	31.0	0.46	0.5
Rosebud	68	7	38.4	0.31	1.5
Silver City				0.33	5.0
Sioux Falls	63	8	35.0	0.53	0.2
Sisseton Agency	56	6	31.5	0.61	1.0
Spearfish	66	13	37.5	0.16	1.4
Tyndall	65	8	37.6	0.18	T.
Vermilion	67	9	36.2	0.45	T.
Watertown	54	3	30.0	0.40	1.0
Waubay	55	4	27.8	0.49	2.5
Wentworth	58	7	33.4	0.64	
Wessington Springs	66	10	35.4	0.72	T.
Wolsey				0.40	2.8
Tennessee.					
Andersonville	78	28	53.6	4.10	
Ashwood	78	26	54.0	5.60	
Benton	79	23	54.6	4.13	
Bluff City				2.22	T.
Bolivar	79	25	54.5	4.37	T.
Bristol	76	28	51.4	2.55	T.
Byrdstown	76	26	53.4	7.60	0.2
Carthage	82	29	55.2	4.89	T.
Charleston				3.17	T.
Clarksville	79	29	55.0	4.76	T.
Clinton				5.00	
Decatur	78	24	54.4	5.18	0.5
Dickson	79	28	54.1		1.6
Dover				5.87	
Elizabethton	76	30	53.2	2.99	T.
Erasmus	76	19	49.8	5.60	1.0
Florence	78	28	54.6	5.63	T.
Franklin	77	29	54.3	4.81	T.
Grace[e1]	80	30	57.2	5.70	
Greeneville	77	28	53.0	2.66	0.3
Harriman	75	28	52.4	4.12	T.
Hohenwald	78	17	52.5	5.04	0.1
Iron City	79	20	54.4	5.76	
Isabella	72	26	51.8	4.75	T.
Jackson	82	27	56.5	4.06	T.
Johnsonville	81	24	54.9	4.51	T.
Jonesboro[e1]	74	33	54.5	2.98	T.
Kenton[e5]	80	28	54.5	4.79	T.
Kingston				4.48	
Leadvale				1.44	0.1
Lebanon	79	26	53.9	2.43	T.
Lewisburg	78	26	54.4	5.04	T.
Liberty	79[b]			3.46[e]	
Lynnville	77	26	55.2	3.69	
McKenzie	84	28	56.4	3.65	T.
McMinnville	78	23	54.2	4.75	1.0
Maryville	77	26	54.6	4.57	T.
Newport	74	29	53.2	2.92	T.
Nunnelly	79	24	54.2	4.57	T.
Palmetto	78	28	55.2	4.71	T.
Pope	84	21	55.4	4.70	T.
Rogersville	80	30	54.2	2.72	T.
Rugby	76	22	51.2	7.18	0.5
Savannah	80	25	57.0	5.81	T.
Sewanee	74	22	53.4	6.10	T.
Silverlake				3.20	1.5
Tazewell				3.75	
Tellico Plains	81	27	55.3	4.32	T.
Tracy City	74	20	51.6	6.35	1.0
Trenton	82	26	55.5	4.20	T.
Union	82	30	55.0	4.98	T.
Waynesboro	78	22	54.2	5.12	
Wildersville	76	27	56.7	4.25	T.
Yukon	78	25	56.8	5.01	
Texas.					
Albany	77	34	57.4	4.70	
Alvin				10.03	
Anna	78	30	58.3	13.47	
Anson				2.40	
Arthur				12.38	
Austin *a*	82	37	62.8	6.20	
Austin *b*[e5]	76	30	60.0		
Ballinger	82	27	58.0	4.09	
Bastrop	86	32	65.5	7.17	
Beaumont	87	36	65.5	22.74	
Beeville	91	37	69.4	8.03	
Bigspring	83	26	55.2	2.28	
Blanco	86	39	60.1	8.14	
Boerne[e1]	79	33	60.7	9.09	
Booth				5.58	
Bowie	78	28	57.8	6.45	
Brazoria	82	36	67.7	5.69	
Brenham	82	38	64.6	8.33	
Brighton	83	33	71.0	3.97	
Burnet	79	29	59.4	7.77	
Camp Eagle Pass	88	39	65.6	2.92	
Childress	79	28	53.7	1.22	
Coleman	81	34	58.6	2.78	
College	83	32	62.6	9.45	

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Texas—Cont'd.	°	°	°	*Ins.*	*Ins.*
Colorado	81	21	56.8	1.77	
Columbia	82	38	67.2	8.45	
Comanche	88	30	59.6	4.99	
Corsicana	88	35	61.8	9.39	
Cotullo	95	33	72.4	2.33	
Cuero	83	35	67.2	5.50	
Dallas	80	31	59.2	10.12	
Danevang	92	34	68.0	8.15	
Dublin	78	30	58.4	3.18	
Duval	89	37	64.5	8.65	
Estelle	80	32	59.2	11.23	
Fort Brown	88	38	71.2	3.32	
Fort Clark	82	32	60.6	2.70	
Fort Davis	79	20	52.8	1.48	6.0
Fort McIntosh	90	31	65.0	1.90	
Fort Ringgold	95	32	74.6	0.41	
Fredericksburg	78[b]	33[b]	57.7[b]	11.72	
Gainesville	78[c]	27	57.4[c]	6.02	
Gatesville	80	30	62.0	5.08	
Georgetown	89	34	64.4	11.42	
Grapevine	80	32	59.3	9.99	
Greenville	89	31	59.0	13.21	
Hale Center	81	26	51.7	1.25	
Hallettsville	85	37	66.8	4.98	
Haskell	82	29	56.5	2.13	
Henrietta	84	29	57.9	6.47	
Hewitt				10.58	
Hondo				2.97	
Houston	82	38	64.7	8.81	
Huntsville	92	35	65.8	6.35	
Ira	83	24	57.4	1.85	
Jacksonville	82	32	62.5	5.95	
Jasper	84	32	65.1	8.45	
Junction				3.36	
Kaufman	79	34	60.8	11.32	
Kent				1.83	0.5
Kerrville	92	25	64.1	11.85	
Kopperl				4.73	
Lampasas	82	32	60.8	7.13	
Lapara				6.11	
Laureles Ranch				6.47	
Llano	82	36	60.5	6.59	
Longview	81	38	62.0	10.71	
Luling	82	32	63.8	4.64	
Mann	82	32	62.5	11.39	
Marlin	85	34	61.8	14.53	
Menardville	84	25	58.2	4.63	
Mount Blanco	80	27	51.6	1.16	
Nacogdoches	81	31	61.8	6.19	
New Braunfels	84	37	64.5	4.60	
Panter	80	36	59.4	5.31	
Paris *a*	82	31	58.8	11.99	
Pearsall	84	35	66.6	3.56	
Port Lavaca	83	39	68.6	6.80	
Rhineland	80	19	55.4	3.10	
Rockisland	86	35	64.6	12.46	
Rockport	78	44	65.0	4.83	
Runge	85	33	66.8	2.77	
Sabine	86[d]	43[d]	66.1[d]	9.70	
Sanderson	85	25	60.6	1.50	
San Saba	81	29	60.2	6.75	
Santa Gertrude Ranch				4.63	
Shaeffer Ranch	89	36	69.2	3.08	
Sherman	79	34	60.0	9.58	
Sugarland	84	35	64.6	4.23	
Sulphur Springs	79	32	60.0	9.69	
Temple *a*	79	34	59.2	13.90	
Temple *b*	79	32	59.2	13.11	
Trinity	88	33	63.6	4.68	
Tulia				1.85	
Tyler	82	34	61.9	9.30	
Victoria	87	36	67.7	2.95	
Waco	85	36	63.2	10.36	
Waxahachie	79	30	57.8	9.95	
Weatherford	80	30	58.8	3.62	
Weimar	84	37	65.0	9.30	
Wichita Falls				7.39	
Utah.					
Aneth	70	18	42.7	1.36	
Blackrock	68	2	35.5	1.97	12.0
Bluecreek[e1]	70	20	43.1	0.87	
Callao	75	6	39.3	0.44	0.5
Castledale	66	5	33.4	1.72	
Cisco	64	26	41.5	1.00	
Corinne	67	20	39.8	1.64	0.5
Coyoto	65	−13	30.4	2.19	21.9
Deseret	69	10	37.7	1.65	12.0
Emery	62	10	34.8	0.29	T.
Escalante	62	14	37.2	1.52	
Farmington	68	14	39.6	1.73	7.5
Fillmore	81	15	41.1	2.70	
Fort Duchesne	64	5	30.2		
Frisco	65	12	35.6	1.22	8.3
Giles	62	13	37.8	0.70	
Government Creek	65	9	36.2	2.29	12.8
Green River	75	15	43.0	2.38	
Grover	64	−3	36.1	2.45	24.5
Heber	68	2	34.3	1.77	13.4

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Utah—Cont'd.	°	°	°	*Ins.*	*Ins.*
Henefer	66	9	34.0	1.51	1.7
Hite	76	24	48.2	1.29	
Huntsville				1.34	2.0
Kanab	69	10	40.6	3.98	10.0
Kelton	59	9	34.0	0.65	T.
La Sal	61	9	35.2	1.31	11.8
Levan	64	11	35.5	1.98	9.3
Loa	65			1.20	12.0
Logan	64	17	36.3	1.80	8.5
Manti	64	7	36.1	1.38	4.1
Marysvale	69	−1	34.8	1.81	14.5
Meadowville	60	9	33.1	0.95	5.0
Millville				2.23	
Minersville	67	9	35.7	2.70	27.0
Moab	73	17	43.7	1.94	T.
Monticello	69	11	34.6	3.28	6.0
Mount Nebo				0.86	
Ogden *a*	65	18	39.6	1.36	0.3
Ogden	70	20	42.1	1.69	3.0
Parowan	62	2	33.6	1.86	16.5
Pinto	65[d]	−4[d]	33.7[d]	3.09	15.0
Plateau	68	−11	31.6	2.55	21.3
Promontory	48	20	33.8	1.10	
Provo	72	15	40.2	1.55	6.3
Ranch	68	1	32.0	5.59	26.0
Richfield	73	8	37.9	1.77	
St. George	78	17	45.2	1.49	
Scipio	72	9	37.8	2.31	13.0
Snowville	63	11	33.9	1.40	
Terrace	59	9	35.5	0.04	T.
Thistle	68	10	36.3	2.10	7.0
Tooele	71	16	38.8	2.56	13.0
Tropic	64	−9	28.0	1.93	3.6
Vernal	64	10	36.2	1.12	2.0
Wellington	64	11	35.0	1.60	T.
Vermont.					
Bellows Falls				0.95	
Burlington	61	20	42.3	1.29	3.0
Chelsea	59	10	37.2	0.50	3.0
Cornwall	61	15	40.6	1.32	4.0
Enosburg Falls	70	−1	38.8	2.59	9.0
Jacksonville	65	12	38.8	0.95	T.
Manchester	66	11	41.2	1.44	1.0
Morrisville	65	4	36.4	1.24	4.0
Newport	64	5	37.6	2.75	6.3
Norwich	62[c]	17[c]	39.8[c]	0.97[c]	2.5
St. Johnsbury	64	6	37.9	1.44	3.0
Wells	62	15	38.6	1.03	1.0
Wells River				0.12	T.
White River Junction				1.00	0.7
Woodstock	76	13	41.4	0.74	2.0
Virginia.					
Alexandria	74	28	51.5	3.34	
Ashland	75	26	52.8	4.19	
Barboursville	86	24	54.8	4.37	
Bedford	78	25	54.5	2.17	T.
Bigstone Gap	76	27	52.0	4.02	T.
Blacksburg	78	19	48.8	4.20	T.
Bluemont	76	29	52.2	3.80	T.
Blueskins	83	33	63.4	3.50	
Bonair	78	27	54.4	4.50	
Buckingham	82	22	52.8	3.66	
Burkes Garden	67	20	46.2	3.69	
Callaville	76	25	56.9	1.78	
Charlottesville	80	29	54.2	5.09	
Clarksville				2.35	
Columbia	81	18	51.2	4.30	
Dale Enterprise	76	20	50.3	3.50	T.
Danville				2.73	
Fredericksburg	73	27	51.9	5.16	T.
Grahams Forge	74[c]	22[c]	50.0[c]	3.50	T.
Hampton	74	35	56.5	2.82	
Hot Springs	70	20	48.1	3.82	
La Crosse	88[b]	28[b]	54.0[b]	0.24	
Lexington	82	21	51.8	4.10	
Lincoln	78	24	51.1	3.66	
Manassas	75	25	49.8	3.22	
Mendota				2.78	T.
Newport News	79	34	57.6	2.78	
Petersburg	79	26	55.0	2.50	
Radford				2.58	
Riverton				1.95	
Rockymount	70	22	51.2	3.17	
Saxe	80	22	53.6	3.31	
Shenandoah				3.64	
Speers Ferry				2.90	T.
Spottsville	80	28	55.7	2.78	
Stanardsville	59	14	37.4	1.10	
Staunton	78	24	52.7	3.61	
Warsaw	75	24	53.2	2.90	
Wilkerson	78	28	53.5	4.39	
Williamsburg	73	28	34.2	3.71	
Woodstock	78	20	49.5	2.44	T.
Wytheville	75	26	50.8	2.58	T.
Washington.					
Aberdeen	55	30	42.2	15.17	
Anacortes				5.61	
Ashford				12.78	7.5

TABLE II.—*Climatological record of voluntary and other cooperating observers*—Continued.

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Washington—Cont'd.	°	°	°	*Ins.*	*Ins.*
Blaine	56	28	42.2	6.65	
Bremerton	58	27	47.6	10.45	
Brinnon	55	32	43.0	14.66	0.3
Cedonia	45	15	32.4	3.83	10.4
Centralia	55	32	43.6	11.59	
Cheney				5.84	5.5
Clearwater	55	31	44.2	20.96	
Cle Elum	48	18	34.9	6.06	6.0
Colfax	60[5]	15[4]	37.6[4]	6.35	2.0
Colville	50	11	34.0	3.27	9.0
Conconully	47	14	32.0	1.86	8.3
Coupeville	57	34	44.2	3.43	
Crescent	52	11	34.0	3.70	4.5
East Sound	58	21	39.7	6.37	
Ellensburg	56	15	36.0	1.53	2.4
Ellensburg (near)	50	18	35.6	1.35	2.0
Grandmound	56	29	43.8	11.83	
Granite Falls				8.14	T.
Hooper	58	24	40.8	3.23	T.
Ilwaco	55	33	46.1	16.77	
Lacenter	56	29	43.0	14.73	
Lakeside	54	20	37.0	1.77	5.0
Lind	64	23[5]	38.2[5]	3.56	3.0
Loomis	52	21	37.2	1.66	7.0
Mayfield	60	28	41.6	12.02	
Mottinger Ranch	63	28	44.2	2.27	
Mount Pleasant	51	37	42.4	12.88	
Moxee	59	16	38.4	1.53	1.5
Olga	55	34	44.4	6.26	T.
Olympia	56	31	45.2	15.09	
Pinehill	55	27	41.6	5.64	T.
Pomeroy	57	19	40.2	5.30	3.0
Port Townsend	56	35	44.8	3.19	
Pullman	51[4]	12[4]	34.4[4]	6.35	1.0
Rattlesnake Mountains	53	22	38.0	2.47	1.0
Republic	48	8	31.6	2.53	6.0
Ritzville				0.97	4.0
Ritzville (near)				2.82	3.0
Rosalia	54	18	36.5	6.25	7.5
Sedro	60	29	42.7	7.81	T.
Silvana	57[1]	29[1]	43.6[1]	5.05	
Snohomish	60	30	43.7	5.86	
Snoqualmie	55	28	44.0	11.50	
Southbend	62	32	45.7	18.83	
Sprague				5.40	3.0
Stampede				6.05	16.0
Sunnyside	60	19	40.1	1.11	0.5
Trinidad	58	22	39.0	0.35	3.0
Union	57	31	43.6	17.82	
Usk				5.51	9.5
Vancouver	60	30	45.5	10.00	
Vashon	57	36	45.2	9.66	
Waterville	50	10	32.7	2.28	9.0
Wenatchee (near)	53	18	35.6	2.08	10.2
Whatcom	60	29	43.6	5.98	T.
Wilbur	52	5	34.2	2.42	4.8
Zindel	63[5]	28[5]	43.4[5]	2.00	
West Virginia.					
Addison	75	25	50.1	3.00	2.0
Bayard	70	12	45.2	2.76	2.5
Beckley	70	26	46.8	2.69	
Beverly	70	18	47.0	3.56	1.0
Burlington	74	19	48.4	2.68	T.
Byrne	82	26	55.6	4.56	1.4
Cairo	78	23	52.4	2.40	T.
Camden	78	26	52.2	3.25	1.5
Central[5]	76	22	49.3	3.29	0.2
Chapel	75	28	51.1	5.32	T.
Charleston				3.94	
Clay	85	17	55.7	4.55	T.
Creston	78	24	50.4	2.65	
Cuba	77	27	51.0	3.02	T.
Dayton	75	21	48.8	2.75	T.
Echo	82	25	52.5	4.80	1.0
Elkhorn	74	29	53.0	4.00	0.5
Fairmont				3.16	T.
Glenville	76	24	50.5	3.32	T.
Grafton	74	23	51.1	3.11	1.5
Green Sulphur	74	24	48.0	2.69	
Harpers Ferry				2.91	
Hinton *b*	74[5]	25[5]	49.2[5]	2.39	
Huntington	77	28	51.0	3.64	T.
Josiah	77	25	50.6	3.82	2.0
Leonard	78	21	52.5	3.23	1.0
Lewisburg	73	22	48.8	3.09	T.
Logan	80	27	53.8	4.03	1.0
Magnolia	75	17	49.3	2.80	1.0
Martinsburg	78	22	48.0	3.55	T.
Morgantown	73	26	52.2	2.24	T.
Moscow	72	23	49.2	1.23	T.
New Martinsville	76	26	52.2	3.08	0.1
Nuttallburg	83	24	55.1	3.85	
Oldfields	80	18	49.4	2.18	T.
Parsons	72	20	46.5	2.60	2.0
Philippi	75	19	49.4	3.01	1.1
Pickens	74	14	48.5	4.03	4.0
Point Pleasant	82	29	53.7	3.16	
Princeton	73	27	48.9	4.15	0.5

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
West Virginia—Cont'd.	°	°	°	*Ins.*	*Ins.*
Romney	83	20	49.0	3.41	T.
Rowlesburg				3.29	T.
Ryan	79	23	51.6	3.89	T.
Southside	78	30	51.4	3.46	0.4
Terra Alta	70	14	46.5	4.18	3.0
Travelers repose	73	12	44.8	2.94	1.5
Uppertract	77	20	50.6	3.19	
Wellsburg	69	25	48.4	1.74	1.5
Weston *a*				3.71	T.
Weston *b*	77	20	52.5		
Wheeling *a*				1.79	
Wheeling *b*	76	31	52.2	1.70	2.0
Williamson	80	29	52.7	3.92	T.
Wisconsin.					
Amherst	62	16	41.4	1.40	2.0
Ashland				2.69	2.5
Bayfield	60	12	33.1	4.26	T.
Beloit	69	20	43.7	1.99	T.
Brodhead	70[5]	10	44.8	2.36	3.0
Butternut	55	3	33.0	2.98	6.0
Chilton	67	18	40.2	1.23	0.2
Darlington	68	0	37.4	1.12	3.5
Dodgeville	65	15	41.8	1.02	2.2
Downing	60	8	35.8	3.80	4.0
Easton	66	13	40.4	1.27	2.0
Eau Claire	63	10	38.2	4.28	1.0
Florence	57	11	35.4	3.44	2.0
Fond du Lac	66	20	43.6	1.35	0.5
Grand River Locks				1.65	2.0
Grantsburg	60	9	34.6	3.05	6.0
Hancock	63	10	39.4	1.35	2.0
Harvey	69	17	42.8	2.47	2.0
Hayward	58	2	34.0	2.42	8.5
Hillsboro	65	4	39.8	1.61	3.0
Koepenick	60	6	35.4	3.60	2.0
Ladysmith	58	9	36.1	4.17	2.5
Lancaster	67	10	40.8	1.33	4.0
Madison	64	16	41.9	1.41	1.3
Manitowoc	65	20	42.4	2.09	T.
Meadow Valley	65	9	39.8	2.29	2.0
Medford	60	9	35.8	5.30	3.0
Menasha				1.03	T.
Neillsville	60	5	38.9	2.85	4.0
New Holstein	69	17	40.4	0.65	
New London	63	15	39.5	1.88	0.5
North Crandon	56[4]	9[4]	32.8[4]	5.75	
Oconto	68	16	42.6	2.17	T.
Osceola	60	9	34.0	2.55	2.5
Oshkosh	66	19	41.6	1.10	
Pepin	58	14	38.2	2.73	1.0
Pine River	65	13	39.9	1.60	1.3
Portage	65	19	42.7	1.04	2.0
Port Washington	68	21	42.6	2.49	T.
Prairie du Chien *b*				0.71	2.0
Prentice	56	5	34.5	4.77	2.0
Racine	71	21	45.8	2.19	
Sheboygan	65	21	44.2	2.13	T.
Stevens Point	64	10	39.0	2.59	2.0
Tomahawk	61	4	34.1	3.37	1.7
Underwood	63	20	40.9	1.44	0.2
Valley Junction	64	12	39.2	3.03	2.0
Viroqua	69	12	39.8	2.52	4.0
Watertown	67	17	42.2	2.42	1.5
Waukesha	67	18	42.8	2.39	1.5
Waupaca	64	9	39.0	1.67	1.5
Wausau	59	9	38.3	3.89	4.0
Whitehall	66	9	40.1	2.59	1.5
Wyoming.					
Alcova	77	−3	37.2	0.08	10.8
Basin	61	−2	31.8	0.03	T.
Bedford	60	−3	29.0	1.23	6.0
Border	61	−3	28.1	0.37	
Buffalo	69	1	34.0	0.02	0.2
Centennial	54	6	29.8	0.33	
Chugwater	70[5]	4[5]	36.0[5]	0.59	3.5
Daniel	55	−5	24.5	0.03	
Evanston	61	−2	30.2	0.58	2.2
Fort Laramie	73	7	38.0	0.14	
Fort Washakie	66	6	34.0	0.05	0.5
Fort Yellowstone	57	3	28.9	2.35	16.5
Fourbear	63	5	31.2	0.26	5.0
Griggs	67	3	36.4	0.85	7.4
Hyattville	70	5	36.6	0.10	1.0
Irma	65	4	36.9	0.42	1.0
Iron Mountain	64	12	35.8	0.09	0.8
Kimball Ranch	61	6	34.8	0.20	2.0
Laramie	63	6	32.6	0.22	2.5
Leo	58	−16	29.8	0.27	4.8
Lolabama Ranch	56	0	27.6	0.69	
Lusk	64	−5	32.8	T.	T.
Moore	65	10	36.6	0.18	
Parkman	60[5]	2[5]	32.4[5]	0.42	T.
Pinebluff	72	3	37.4	T.	T.
Rawlins	59	9	31.7	0.23	2.3
Red Bank	66	4	36.8	0.64	0.2
Rocksprings	70	6	35.6	0.01	0.1
Saratoga	64	−2	31.8	0.65	3.0
South Pass City	52	−10	23.2	0.50	5.0

Stations.	Temperature. (Fahrenheit.) Maximum.	Minimum.	Mean.	Precipitation. Rain and melted snow.	Total depth of snow.
Wyoming—Cont'd.	°	°	°	*Ins.*	*Ins.*
Thayne	59	−1	28.5	1.13	4.2
Thermopolis	68	0	34.8	0.20	
Porto Rico.					
Adjuntas	90	50	72.0	6.58	
Aguadilla	88	65	77.6	4.76	
Aguirre	88	65	78.4	4.39	
Arecibo	91	60	75.8	6.09	
Barros	87	55	72.0	4.26	
Bayamon	95	62	78.6	7.32	
Caguas	95	48	74.0	4.31	
Canovanas	89	68	78.4	11.49	
Cayey	93	54	74.0	4.37	
Cidra	90	54	72.8	3.60	
Coamo	92	64	78.4	2.23	
Fajardo	90	64	77.2	8.67	
Guanica	91	58	77.7	2.26	
Guayama				7.70	
Hacienda Armistad	92	55	75.8	4.96	
Hacienda Coloso	90	58	76.0	7.87	
Hacienda Perla	90	68	77.6	13.03	
Humacao	91	72	81.7	9.85	
Isabela	88	62	76.3	5.54	
Juana Diaz	92	65	79.6	2.63	
La Isolina	88	60	75.4	8.01	
Las Marias	89	64	76.8	6.20	
Manati	90	61	77.0	11.32	
Maunabo	90	67	77.3	11.04	
Mayaguez	92	62	77.5	9.14	
Morovis	94	64	77.3	5.85	
Ponce[5]	91	62	78.8	0.42	
Rio Piedras				6.34	
San German	90	64	78.2	8.90	
San Salvador	87	56	73.7	7.55	
Santa Isabel	89	62	78.0	2.48	
Utuado	90	51	74.5	7.88	
Yauco	86	62	77.5	1.82	
Mexico.					
Ciudad P. Diaz	81	34	64.5	3.16	
Coatzacoalcos	89	42	74.8	8.93	
Leon de Aldamas	78	38	60.7	0.12	
Vera Cruz	82	63	74.6	2.16	
New Brunswick.					
St. John			39.4	1.48	3.8
Isthmus of Panama.					
Alhajuela	92	72	79.5	18.66	
La Boca	87	72	78.4	11.42	
West Indies.					
Roseau, Dominica	89	70	80.3	9.38	

Late reports for October, 1902.

Alaska.	°	°	°	*Ins.*	*Ins.*
Copper center	66	1	34.4	0.72	13.0
Fort Egbert	68	8	31.8	0.76	8.6
Fort Liscum	50	18	34.9	18.20	24.5
Orca	57	30	41.0	35.56	
Skagway	58	25	44.0	1.75	
Tyoonok	58	20	12.2	4.93	4.0
Arizona.					
Willcox [1]	86	37	63.9	0.20	
California.					
Caliente [1]	81	32	64.0	0.00	
Drytown	85	43	60.1	1.20	
Mammoth	96	56	77.0	0.00	
Sonoma				5.07	
Colorado.					
Telluride	69	18	42.8	1.18	3.2
Wagon Wheel	70	13	39.4	1.10	14.0
Waterdale				0.96	
Florida.					
Lake City	91	43	72.0	3.32	
Idaho.					
Vernon				0.35	
Missouri.					
Koshkonong	81	34	60.7	2.60	
Nebraska.					
Benkelman	80	30	49.0		
Grand Island *a*				3.54	
Grand Island *c*	80	23	54.2	4.38	
Hayes Center				1.85	
Mason				2.03	
North Carolina.					
Brewers	89	28	59.2	4.68	
South Dakota.					
Plankinton	82	29	51.1	0.76	
Texas.					
Anson				1.65	
Utah.					
Millville				0.43	
Vermont.					
Hartland	76	19	46.4	4.19	
Virginia.					
Lincoln	80	30	58.2	4.18	
West Virginia.					
Travellers Repose	77[5]	17[5]	50.8[5]	2.08	1.0

TABLE III.—*Resultant winds from observations at 8 a. m. and 8 p. m., daily, during the month of November, 1902.*

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
New England.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
Eastport, Me	19	21	11	25	s. 78 w.	14
Portland, Me	26	18	6	21	n. 62 w.	17
Concord, N. H	12	8	8	10	n. 27 w.	4
Northfield, Vt	19	35	3	9	s. 21 w.	17
Boston, Mass	23	18	7	27	n. 76 w.	21
Nantucket, Mass	25	16	13	18	n. 29 e.	10
Block Island, R. I	22	16	15	21	n. 45 w.	8
New Haven, Conn	29	19	7	16	n. 42 w.	14
Middle Atlantic States.						
Albany, N. Y	25	21	16	12	n. 45 e.	6
Binghamton, N. Y.†	11	5	13	7	n. 45 e.	8
New York, N. Y	21	16	12	27	n. 72 w.	16
Harrisburg, Pa	18	11	22	22	n.	7
Philadelphia, Pa	24	15	16	19	n. 18 w.	10
Scranton, Pa	22	17	24	14	n. 63 e.	11
Atlantic City, N. J	23	13	17	23	n. 31 w.	12
Cape May, N. J	24	18	11	20	n. 56 w.	11
Baltimore, Md	27	14	14	16	n. 9 w.	13
Washington, D. C	25	20	14	13	n. 11 e.	5
Lynchburg, Va	16	21	17	21	s. 39 w.	6
Norfolk, Va	21	22	15	13	s. 63 e.	2
Richmond, Va	21	22	16	16	s.	1
South Atlantic States.						
Asheville, N. C	21	25	16	14	s. 27 e.	4
Charlotte, N. C	20	23	21	12	s. 72 e.	10
Hatteras, N. C	23	12	19	15	n. 14 e.	16
Kitty Hawk, N. C.†						
Raleigh, N. C	23	18	14	20	n. 50 w.	8
Wilmington, N. C	23	14	22	15	n. 38 e.	11
Charleston, S. C	29	11	21	12	n. 27 e.	20
Columbia, S. C	24	17	23	9	n. 63 e.	16
Augusta, Ga	32	10	14	23	n. 22 w.	24
Savannah, Ga	27	11	23	12	n. 34 e.	19
Jacksonville, Fla	35	13	15	11	n. 10 e.	22
Florida Peninsula.						
Jupiter, Fla	16	12	29	14	n. 75 e.	16
Key West, Fla	27	6	37	4	n. 57 e.	39
Tampa, Fla	33	10	23	11	n. 28 e.	26
Eastern Gulf States.						
Atlanta, Ga	15	22	23	15	s. 49 e.	11
Macon, Ga.†	19	5	5	6	n. 4 w.	14
Pensacola, Fla.†	17	2	13	4	n. 31 e.	18
Mobile, Ala	31	12	16	14	n. 6 e.	19
Montgomery, Ala	18	9	28	11	n. 57 e.	20
Meridian, Miss†	10	3	12	7	n. 36 e.	9
Vicksburg, Miss	11	20	32	10	s. 68 e.	24
New Orleans, La	22	20	27	9	n. 84 e.	18
Western Gulf States.						
Shreveport, La	9	26	28	13	s. 65 e.	17
Fort Smith, Ark	10	9	33	14	n. 87 e.	19
Little Rock, Ark	17	21	21	15	s. 56 e.	7
Corpus Christi, Tex	14	23	30	8	s. 68 e.	24
Fort Worth, Tex	17	25	22	14	s. 45 e.	11
Galveston, Tex	13	20	35	7	s. 76 e.	29
Palestine, Tex	14	24	27	9	s. 61 e.	21
San Antonio, Tex	14	22	29	11	s. 66 e.	20
Taylor, Tex †	11	13	10	6	s. 63 e.	4
Ohio Valley and Tennessee.						
Chattanooga, Tenn	18	23	13	18	s. 45 w.	7
Knoxville, Tenn	22	14	17	21	n. 27 w.	9
Memphis, Tenn	15	27	20	12	s. 34 e.	14
Nashville, Tenn	17	30	12	13	s. 4 w.	13
Lexington, Ky. †	5	17	9	9	s.	12
Louisville, Ky	13	22	17	14	s. 18 e.	10
Evansville, Ind.†	9	14	10	3	s. 54 e.	9
Indianapolis, Ind	17	29	11	15	s. 18 w.	13
Cincinnati, Ohio	14	24	27	15	s. 50 e.	16
Columbus, Ohio	12	26	16	23	s. 27 w.	16
Pittsburg, Pa	12	23	15	27	s. 47 w.	16
Parkersburg, W. Va	12	25	19	16	s. 13 e.	13
Elkins, W. Va	20	18	8	22	n. 82 w.	14
Lower Lake Region.						
Buffalo, N. Y	8	21	13	27	s. 47 w.	19
Oswego, N. Y	12	31	12	16	s. 12 w.	19
Rochester, N. Y	6	29	10	26	s. 35 w.	28
Syracuse, N. Y	10	31	11	19	s. 21 w.	22
Erie, Pa	13	25	8	26	s. 56 w.	22
Cleveland, Ohio	10	30	19	14	s. 14 e.	21
Sandusky, Ohio†	7	13	6	13	s. 49 w.	9
Toledo, Ohio	12	29	11	21	s. 39 w.	20
Detroit, Mich	12	26	11	26	s. 47 w.	20
Upper Lake Region.						
Alpena, Mich	18	21	12	23	s. 75 w.	11
Escanaba, Mich	20	27	9	23	s. 63 w.	16
Grand Haven, Mich	15	24	16	20	s. 24 w.	10
Houghton, Mich.†	8	9	11	9	s. 63 e.	2
Marquette, Mich	19	21	6	24	s. 84 w.	18
Port Huron, Mich	15	27	12	24	s. 40 w.	16
Sault Ste. Marie, Mich	13	20	23	20	s. 23 w.	8
Chicago, Ill	16	25	10	25	s. 59 w.	18
Milwaukee, Wis	17	25	6	29	s. 71 w.	24
Green Bay, Wis	14	26	11	23	s. 45 w.	17
Duluth, Minn	19	20	11	30	s. 87 w.	19
North Dakota.						
Moorhead, Minn	22	18	16	20	n. 45 w.	6
Bismarck, N. Dak	25	16	18	15	n. 18 e.	10
Williston, N. Dak	23	22	12	16	n. 76 w.	4

Stations.	Component direction from—				Resultant.	
	N.	S.	E.	W.	Direction from—	Duration.
Upper Mississippi Valley.	*Hours.*	*Hours.*	*Hours.*	*Hours.*	°	*Hours.*
St. Paul, Minn	20	21	13	22	s. 84 w.	9
La Crosse, Wis. †	10	15	4	6	s. 22 w.	5
Davenport, Iowa	14	23	12	22	s. 48 w.	14
Des Moines, Iowa	18	24	13	19	s. 45 w.	8
Dubuque, Iowa	18	28	14	17	s. 17 w.	10
Keokuk, Iowa	18	28	9	21	s. 50 w.	16
Cairo, Ill	18	30	12	12	s.	12
Springfield, Ill	13	31	10	22	s. 34 w.	22
Hannibal, Mo. †	9	13	4	11	s. 60 w.	8
St. Louis, Mo	16	34	9	10	s. 3 w.	18
Missouri Valley.						
Columbia, Mo. *	6	14	8	5	s. 21 e.	8
Kansas City, Mo	20	29	12	11	s. 6 e.	9
Springfield, Mo	15	30	23	10	s. 41 e.	20
Topeka	10	14	4	3	s. 14 e.	4
Lincoln, Nebr	21	29	8	13	s. 32 w.	9
Omaha, Nebr	21	30	5	15	s. 48 w.	14
Valentine, Nebr	18	22	11	24	s. 73 w.	14
Sioux City, Iowa †	11	12	4	10	s. 80 w.	6
Pierre, S. Dak	22	13	23	14	n. 45 e.	13
Huron, S. Dak	23	23	13	16	w.	3
Yankton, S. Dak. †	12	10	6	12	n. 72 w.	6
Northern Slope.						
Havre, Mont	13	18	16	29	s. 69 w.	14
Miles City, Mont	19	23	10	15	s. 51 w.	6
Helena, Mont	12	24	9	32	s. 62 w.	26
Kalispell, Mont	13	18	1	42	s. 83 w.	41
Rapid City, S. Dak	21	11	13	26	n. 43 w.	19
Cheyenne, Wyo	16	16	1	36	w.	35
Lander, Wyo	9	30	12	20	s. 69 w.	22
North Platte, Nebr	16	21	14	23	s. 61 w.	10
Middle Slope.						
Denver, Colo	20	24	14	14	s.	4
Pueblo, Colo	28	11	15	20	n. 16 w.	18
Concordia, Kans	22	26	9	10	s. 14 w.	4
Dodge, Kans	23	23	16	9	e.	7
Wichita, Kans	25	28	6	7	s. 18 w.	3
Oklahoma, Okla	25	23	11	9	n. 45 e.	3
Southern Slope.						
Abilene, Texas	15	28	23	11	s. 43 e.	18
Amarillo, Tex	20	26	11	13	s. 18 w.	6
Southern Plateau.						
El Paso, Texas	20	4	16	34	n. 48 w.	24
Santa Fe, N. Mex	20	17	32	3	n. 83 e.	24
Flagstaff, Ariz	18	22	17	23	s. 56 w.	7
Phoenix, Ariz	17	7	28	19	n. 42 e.	14
Yuma, Ariz	31	13	15	11	n. 13 e.	18
Independence, Cal	28	13	11	27	n. 47 w.	22
Middle Plateau.						
Carson City, Nev	13	27	10	21	s. 38 w.	18
Winnemucca, Nev	12	25	15	24	s. 35 w.	16
Modena, Utah	9	15	13	33	s. 73 w.	21
Salt Lake City, Utah	19	24	23	8	s. 72 e.	16
Grand Junction, Colo	17	12	21	25	n. 39 w.	6
Northern Plateau.						
Baker City, Oreg	10	35	22	14	s. 18 e.	26
Boise, Idaho	7	22	28	16	s. 39 e.	19
Lewiston, Idaho †	0	10	14	11	s. 17 e.	10
Pocatello, Idaho	3	32	19	18	s. 2 e.	29
Spokane, Wash	13	27	17	14	s. 12 e.	14
Walla Walla, Wash	2	45	8	10	s. 3 w.	43
North Pacific Coast Region.						
Neah Bay, Wash						
North Head, Wash	13	24	20	17	s. 15 w.	11
Port Crescent, Wash. *	0	13	13	12	s. 4 e.	13
Seattle, Wash	8	29	33	3	s. 55 e.	37
Tacoma, Wash	13	36	9	17	s. 19 w.	24
Astoria, Oreg	15	20	14	24	s. 63 w.	11
Portland, Oreg	7	37	14	13	s. 2 e.	30
Roseburg, Oreg	10	28	14	21	s. 21 w.	19
Middle Pacific Coast Region.						
Eureka, Cal	12	30	19	12	s. 21 e.	19
Mount Tamalpais, Cal	23	10	8	26	n. 38 w.	29
Red Bluff, Cal	27	17	14	16	n. 11 w.	10
Sacramento, Cal	14	24	26	11	s. 56 e.	18
San Francisco, Cal	15	15	12	26	w.	14
South Pacific Coast Region.						
Fresno, Cal	15	14	25	22	n. 72 e.	3
Los Angeles, Cal	21	13	19	22	n. 21 w.	8
San Diego, Cal	25	8	19	21	n. 7 w.	17
San Luis Obispo, Cal	32	12	1	18	n. 40 w.	26
West Indies.						
Basseterre St. Kitts, W. I	14	10	44	3	n. 84 e.	41
Bridgetown, Barbados	2	10	53	0	s. 82 e.	54
Cienfuegos, Cuba	22	4	47	1	n. 69 e.	49
Colon, Columbia, S. A.†						
Grand Turk, Turks Island †						
Hamilton, Bermuda	28	16	14	8	n. 27 e.	13
Havana, Cuba	15	6	43	3	n. 77 e.	41
Kingston, Jamaica	49	0	25	1	n. 26 e.	55
Port of Spain, Trinidad, W. I †	1	10	18	7	s. 51 e.	14
Puerto Principe, Cuba	32	3	41	3	n. 52 e.	48
Roseau, Dominica, W. I †	9	9	11	11		
San Juan, Porto Rico	1	39	28	5	s. 31 w.	44
Santiago de Cuba, Cuba	43	6	18	3	n. 22 e.	40
Santo Domingo, S. Dom., W. I	56	1	5	3	n. 2 e.	55
Willemstad	3	6	55	1	s. 87 e.	54

* From observations at 8 p. m. only. † From observations at 8 a. m. only.

TABLE IV.—*Thunderstorms and auroras, November, 1902.*

States.	No. of stations.		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Total. No.	Total. Days.	
Alabama	52	T.	1																1							1	1						4	4	T.
		A.																														0	0	A.
Arizona	56	T.	4									1	3	3																	1		12	5	T.
		A.																														0	0	A.
Arkansas	57	T.													2		4	4				1	2			3		1					17	7	T.
		A.																														0	0	A.
California	167	T.										1	2		1			2		3	1	2									1		13	8	T.
		A.																							1							1	1	A.
Colorado	81	T.											2		1									2									5	3	T.
		A.																														0	0	A.
Connecticut	21	T.																							1	1					1		3	3	T.
		A.																														0	0	A.
Delaware	5	T.																														0	0	T.
		A.																														0	0	A.
Dist. of Columbia	4	T.						1																								1	1	T.
		A.																														0	0	A.
Florida	47	T.				1	1		1		1				1				1									3			2	5	16	9	T.
		A.																														0	0	A.
Georgia	55	T.						3	1										2								1				5		12	5	T.
		A.																														0	0	A.
Idaho	34	T.																														0	0	T.
		A.																														0	0	A.
Illinois	92	T.	7	7	1	1	1					1	2					5	1													26	9	T.
		A.								1								1	1			1										3	3	A.
Indiana	58	T.										9	11					6	1													27	4	T.
		A.																														0	0	A.
Indian Territory	11	T.												1				1			2	4		1	1								10	6	T.
		A.																														0	0	A.
Iowa	149	T.		2																												2	1	T.
		A.																														0	0	A.
Kansas	77	T.	9	7							1			1	4								1		1	1							25	8	T.
		A.																									1					1	1	A.
Kentucky	41	T.																1														1	1	T.
		A.																														0	0	A.
Louisiana	46	T.			1	2											2	1							1	1	3				2	13	8	T.
		A.																														0	0	A.
Maine	19	T.																														0	0	T.
		A.																							3							3	1	A.
Maryland	48	T.						10																2		1						13	3	T.
		A.																														0	0	A.
Massachusetts	48	T.																														0	0	T.
		A.																							2							2	1	A.
Michigan	106	T.		2				1								2																5	3	T.
		A.		1																					2	1						4	3	A.
Minnesota	67	T.			3									2																		5	2	T.
		A.																						1	3							4	2	A.
Mississippi	44	T.				1																				7	1					9	3	T.
		A.																														0	0	A.
Missouri	95	T.	8	12								1						2				1										24	5	T.
		A.																														0	0	A.
Montana	40	T.																														0	0	T.
		A.																							1	1						2	2	A.
Nebraska	142	T.	8	2										2	1										3	1						17	6	T.
		A.																														0	0	A.
Nevada	40	T.																														0	0	T.
		A.																														0	0	A.
New Hampshire	19	T.																														0	0	T.
		A.																							2							2	1	A.
New Jersey	51	T.						4																								4	1	T.
		A.																														0	0	A.
New Mexico	31	T.																						3								3	1	T.
		A.																														0	0	A.
New York	99	T.											2	2																		4	2	T.
		A.		1	1		1										1			1				1	1							7	7	A.
North Carolina	56	T.						6	1	1								1	2	2							1	1				15	8	T.
		A.																														0	0	A.
North Dakota	48	T.																														0	0	T.
		A.																						1	5	1						7	3	A.
Ohio	128	T.					1	1					3																			5	3	T.
		A.																							1							1	1	A.
Oklahoma	23	T.	1	1		1								1	3							7	3		4							21	8	T.
		A.																														0	0	A.
Oregon	74	T.						1	1				1	1	2			5	3	2									1			17	9	T.
		A.																														0	0	A.
Pennsylvania	91	T.																						2								2	1	T.
		A.																							1							1	1	A.
Rhode Island	7	T.																							1							1	1	T.
		A.																							1							1	1	A.
South Carolina	46	T.						3	3										2	1											1	10	5	T.
		A.																														0	0	A.
South Dakota	56	T.		1																								1				2	2	T.
		A.																							5							5	1	A.
Tennessee	56	T.														2		1	1													4	3	T.
		A.																														0	0	A.
Texas	95	T.	5	10	3	2		1	3						13	2	13	12				8	10	10	5	6						103	15	T.
		A.																														0	0	A.
Utah	47	T.	2										1	1									2									6	4	T.
		A.																														0	0	A.
Vermont	16	T.																														0	0	T.
		A.																							1							1	1	A.
Virginia	50	T.						1																		1						2	2	T.
		A.																														0	0	A.
Washington	64	T.			2			1		1								2	1													7	5	T.
		A.																														0	0	A.
West Virginia	43	T.																														0	0	T.
		A.																													1	1	1	A.
Wisconsin	60	T.	3	8	1										3																	15	4	T.
		A.		1																					2	4	1		1			9	5	A.
Wyoming	31	T.																														0	0	T.
		A.																														0	0	A.
Sums	2,893	T.	48	52	11	8	3	29	14	2	2	13	27	14	31	6	19	43	15	8	3	23	18	20	17	23	7	5	1	1	4	14		481	....	T.
		A.	0	3	1	0	1	0	0	1	0	0	0	0	0	0	1	0	1	1	0	1	0	3	31	7	2	0	1	0	1	0	0	55	....	A.

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, for storms in which the rate of fall equaled or exceeded 0.25 in any 5 minutes, or 0.75 in 1 hour during November, 1902, at all stations furnished with self-registering gages.*

Stations.	Date.	Total duration.		Total amount of precipitation.	Excessive rate.		Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated.													
		From—	To—		Began—	Ended—		5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Albany, N. Y	26-27			0.61														0.14			
Alpena, Mich	5-6			1.01														*			
Asheville, N. C	17			0.75														0.21			
Atlanta, Ga	25			1.43														0.54			
Atlantic City, N. J	24-26			2.21														0.21			
Augusta, Ga	17-18			0.93														0.70			
Baltimore, Md	6-7			0.96														0.64			
Binghamton, N. Y	22			0.16						0.14											
Bismarck, N. Dak	11			T.																	
Block Island, R. I	25-26			0.82														0.19			
Boise, Idaho	18-19			0.71														0.13			
Boston, Mass	26			0.96														0.22			
Buffalo, N. Y	26-27			0.41														0.07			
Cairo, Ill	5			0.97														0.23			
Charleston, S. C	29-30			1.50														0.40			
Charlotte, N. C	17-18	6:03 p. m.	8:30 a. m.	1.94	10:00 p. m.	11:59 p. m.	0.34	0.05	0.16	0.21	0.30	0.41	0.43	0.45	0.51	0.55	0.58	0.61	0.70	0.99	1.24
Chattanooga, Tenn	24-25	2:09 p. m.	6:55 a. m.	1.99	1:54 a. m.	2:52 a. m.	0.95	0.03	0.05	0.10	0.16	0.25	0.36	0.46	0.57	0.65	0.70	0.77			
Chicago, Ill	4-5			1.24														0.14			
Cincinnati, Ohio	17			0.57														0.17			
Cleveland, Ohio	16-17			0.69														0.15			
Columbia, Mo	4-5			0.92														0.18			
Columbia, S. C	17			0.86														0.51			
Columbus, Ohio	5			0.73														0.35			
Corpus Christi, Tex	14	2:40 a. m.	5:45 a. m.	0.88	3:27 a. m.	4:00 a. m.	0.07	0.12	0.16	0.25	0.53	0.64	0.68	0.70							
	16	2:20 p. m.	8:30 p. m.	1.66	3:18 p. m.	4:25 p. m.	0.32	0.22	0.41	0.46	0.55	0.64	0.68	0.69	0.73	0.81	0.93	1.12	1.26		
Davenport, Iowa	4-5			0.99														0.12			
Denver, Colo	15			0.31														*			
Des Moines, Iowa	2			0.52														0.37			
Detroit, Mich	5			0.52														0.17			
Dodge, Kans	1-2			0.37														0.12			
Dubuque, Iowa	14			0.68														0.19			
Duluth, Minn	2			0.48														0.14			
Eastport, Me	12			0.38														0.15			
Elkins, W. Va	24-25			1.75														0.18			
Erie, Pa	16-17			0.53														0.06			
Escanaba, Mich	11			1.50														0.34			
Evansville, Ind	16-17			1.87														0.58			
Fort Smith, Ark	23-25			2.01														0.47			
Fort Worth, Tex	15-16	7:45 p. m.	5:00 a. m.	3.24	8:10 p. m.	8:56 p. m.	0.03	0.06	0.12	0.21	0.29	0.37	0.58	0.69	0.85	0.99	1.00	1.02			
					12:01 a. m.	1:00 a. m.	1.07	0.12	0.15	0.18	0.21	0.29	0.38	0.54	0.62	0.78	0.92	1.35	1.44	1.53	
Do	24	7:15 a. m.	2:15 p. m.	1.62	8:00 a. m.	8:25 a. m.	0.02	0.25	0.30	0.36	0.45	0.50	0.53	0.55							
Galveston, Tex	3-4	6:39 p. m.	D. N.	1.94	7:25 p. m.	7:45 p. m.	0.24	0.09	0.29	0.42	0.52	0.55	0.57	0.60							
Grand Haven, Mich	2			0.52														0.34			
Grand Junction, Colo	12			0.62														0.24			
Green Bay, Wis	2			0.27														0.25			
Harrisburg, Pa	26-27			0.33														0.20			
Hatteras, N. C	6-7			2.73														0.54			
Huron, S. Dak	1			0.17														0.14			
Indianapolis, Ind	16-17			0.72														0.14			
Jacksonville, Fla	30			0.83														0.66			
Jupiter, Fla	6			0.61														0.38			
Kalispell, Mont	8-9			*														*			
Kansas City, Mo	13-14			1.16														0.55			
Key West, Fla	13-14	4:15 p. m.	6:30 a. m.	3.54	3:10 a. m.	4:00 a. m.	1.27	0.07	0.23	0.30	0.34	0.39	0.44	0.49	0.52	0.56	0.61				
					4:00 a. m.	6:00 a. m.		0.67	0.71	0.76	0.85	0.98	1.03	1.09	1.18	1.35	1.46	1.68	1.92	2.09	2.26
Knoxville, Tenn	24-25			1.95														0.54			
La Crosse, Wis	14			1.02														0.20			
Lewiston, Idaho	18-19			0.52														0.17			
Lexington, Ky	17			0.70														0.22			
Lincoln, Nebr	1-2			1.02														0.46			
Little Rock, Ark	16			2.79														0.69			
Los Angeles, Cal	9-10	9:27 p. m.	7:45 p. m.	1.95	1:55 p. m.	2:25 p. m.	0.87	0.09	0.28	0.43	0.46	0.49	0.55	0.58	0.60	0.62					
Louisville, Ky	24-25			1.31														0.14			
Lynchburg, Va	17-18			1.20														0.36			
Macon, Ga	25			0.96														0.68			
Memphis, Tenn	24-25			2.13														0.46			
Meridian, Miss	24-25	11:09 p. m.	D. N.	1.40	2:05 a. m.	2:45 a. m.	0.17	0.10	0.30	0.49	0.54	0.58	0.65	0.75	0.82	0.84	0.87	0.90			
Milwaukee, Wis	4-5			1.21														0.39			
Montgomery, Ala	25	D. N.	4:30 p. m.	1.03	8:25 a. m.	8:55 a. m.	0.29	0.15	0.24	0.30	0.37	0.44	0.51	0.54	1.57						
Nantucket, Mass	25-26			0.74														0.12			
Nashville, Tenn	24-25			2.06														0.35			
New Haven, Conn	30			0.42														0.15			
New Orleans, La	25	4:30 a. m.	5:45 a. m.	1.05	4:45 a. m.	5:20 a. m.	0.04	0.20	0.33	0.47	0.71	0.93	1.02	1.04							
New York, N. Y	25-26			0.71														0.11			
Norfolk, Va	25-26			1.17														0.32			
Northfield, Vt	12			0.18														0.12			
Oklahoma, Okla	12-13	8:50 p. m.	11:25 a. m.	2.35	11:37 p. m.	12:45 a. m.	0.07	0.05	0.11	0.23	0.28	0.31	0.33	0.43	0.57	0.67	0.76	1.26	1.62	1.71	1.78
Omaha, Nebr	1			0.40									0.35								
Palestine, Tex	16	5:25 a. m.	9:30 a. m.	1.94	5:30 a. m.	6:20 a. m.	0.02	0.07	0.17	0.25	0.33	0.41	0.44	0.50	0.58	0.66	0.84				
					6:20 a. m.	6:50 a. m.		0.99	1.11	1.18	1.23	1.29	1.34	1.37	1.40	1.43					
Parkersburg, W. Va	24-25			1.30														0.13			
Pensacola, Fla	29-30			1.53														0.25			
Philadelphia, Pa	24-25			0.86														0.10			
Pittsburg, Pa	25-26			0.32														0.08			
Pocatello, Idaho	10-11			0.59														0.16			
Portland, Me	6			0.10														0.06			
Portland, Oreg	2-3			2.05														0.18			
Pueblo, Colo	12-13			0.38														0.17			
Raleigh, N. C	18			0.79						0.39											
Richmond, Va	18			2.77														0.71			
Rochester, N. Y	26-27			0.38														0.08			
St. Louis, Mo	23-24			0.82														0.23			
St. Paul, Minn	2			0.63														0.29			
Salt Lake City, Utah	10-11			0.49														0.22			
San Diego, Cal	19-20			0.81														0.27			
Sandusky, Ohio	5			0.22														0.13			
San Francisco, Cal	9-10			1.38														0.28			
Savannah, Ga	29-30			2.88														0.63			
Scranton, Pa	26			0.27														0.20			
Seattle, Wash	16-17			0.96														0.18			
Shreveport, La	24	11:15 a. m.	5:00 p. m.	1.63	3:45 p. m.	4:20 p. m.	0.56	0.11	0.22	0.44	0.69	0.79	0.91	1.01							
Spokane, Wash	7-8			1.41														*			
Springfield, Ill	4-5			1.28														0.15			

TABLE V.—*Accumulated amounts of precipitation for each 5 minutes, etc.*—Continued.

Stations.	Date.	Total duration. From—	Total duration. To—	Total amount of precipitation.	Excessive rate. Began—	Excessive rate. Ended—	Amount before excessive began.	Depths of precipitation (in inches) during periods of time indicated. 5 min.	10 min.	15 min.	20 min.	25 min.	30 min.	35 min.	40 min.	45 min.	50 min.	60 min.	80 min.	100 min.	120 min.
	1	2	3	4	5	6	7														
Springfield, Mo	13–14			1.28														0.27			
Tampa, Fla	7			0.54														0.23			
Taylor, Tex.	22	12:25 a. m.	11:45 a. m.	1.68	8:15 a. m.	9:10 a. m.	0.15	0.08	0.40	0.58	0.74	0.83	0.87	0.94	1.01	1.07	1.15	1.23			
Toledo, Ohio	16–17			0.46														0.13			
Topeka, Kan	13–14			0.85														*			
Valentine, Nebr	12			0.27														*			
Vicksburg, Miss	24–25	9:23 p. m.	8:10 a. m.	1.49	9:35 p. m.	10:20 p. m.	0.02	0.07	0.16	0.23	0.27	0.48	0.69	0.80	0.87	0.93	0.95	0.98			
Washington, D. C	6			0.49														0.44			
Wilmington, N. C	30			1.03														0.47			
Yankton, S. Dak	12			0.23														0.08			
Basseterre, St. Kitts	25	12:01 a. m.	6:40 p. m.	3.09	3:26 a. m.	4:08 a. m.	0.26	0.10	0.21	0.40	0.84	1.10	1.30	1.47	1.88	1.92	1.93	1.96			
Bridgetown, Barbados	25			0.94														0.46			
Cienfuegos, Cuba	19	3:00 p. m.	4:15 p. m.	0.97	3:04 p. m.	3:48 p. m.	T.	0.07	0.12	0.19	0.40	0.58	0.67	0.71	0.86	0.94					
Do		5:32 p. m.	6:40 p. m.	0.78	6:07 p. m.	6:19 p. m.	0.02	0.41	0.69	0.74	0.75										
Havana, Cuba	10			1.54														0.50			
Kingston, Jamaica	2			0.64														0.57			
Puerto Principe, Cuba	12			0.31														0.14			
San Juan, Porto Rico	12–13	7:09 p. m.	D. N.	1.29	7:50 p. m.	8:34 p. m.	0.10	0.12	0.14	0.19	0.20	0.25	0.46	0.59	0.64	0.72					
Santiago de Cuba, Cuba	17	1:32 p. m.	2:48 p. m.	0.84	2:16 p. m.	2:37 p. m.	0.31	0.18	0.34	0.42	0.50	0.53									
Santo Domingo, S. Dom.	12	3:26 p. m.	3:50 p. m.	0.65	3:26 p. m.	3:38 p. m.	0.00	0.21	0.53	0.65											
Do		4:40 p. m.	5:20 p. m.	0.68	4:40 p. m.	5:05 p. m.	0.00	0.12	0.26	0.41	0.58	0.66									
Willemstad, Curaçoa	25	11:33 a. m.	2:55 p. m.	2.05	12:03 p. m.	1:10 p. m.	0.03	0.09	0.14	0.21	0.30	0.70	1.10	1.26	1.43	1.57	1.68	1.85	2.00		

TABLE VI.—*Data furnished by the Canadian Meteorological Service, November, 1902.*

Stations.	Pressure, in inches. Actual, reduced to mean of 24 hours.	Pressure, in inches. Sea level, reduced to mean of 24 hours.	Pressure, in inches. Departure from normal.	Temperature. Mean.	Temperature. Departure from normal.	Temperature. Mean maximum.	Temperature. Mean minimum.	Precipitation. Total.	Precipitation. Departure from normal.	Precipitation. Depth of snow.
	Ins.	*Ins.*	*Ins.*	°	°	°	°	*Ins.*	*Ins.*	*Ins.*
St. Johns, N. F	29.76	29.90	—.04	35.9	— 0.6	42.0	29.7	3.47	—2.10	0.4
Sydney, C. B. I	30.00	30.04	+.09	39.4	+ 2.3	45.2	33.6	3.20	—2.24	3.0
Halifax, N. S	29.94	30.05	+.04	42.8	+ 5.5	50.1	35.5	3.81	—1.85	T.
Grand Manan, N. B	29.98	30.03	+.02	41.5	+ 1.6	47.8	35.2	2.19	—3.43	1.6
Yarmouth, N. S	29.99	30.06	+.04	42.3	+ 2.4	48.9	35.7	3.08	—1.48	0.7
Charlottetown, P. E. I	29.98	30.02	+.06	38.3	+ 2.8	44.2	32.4	1.98	—1.99	8.9
Chatham, N. B	29.97	29.99	+.02	34.1	+ 3.1	42.5	25.8	2.24	—1.51	9.6
Father Point, Que	28.96	29.98	+.02	32.2	+ 3.3	39.2	25.2	2.90	—0.21	19.1
Quebec, Que	29.69	30.03	+.01	33.4	+ 4.4	39.3	27.5	2.39	—1.37	6.8
Montreal, Que										
Bissett, Ont										
Ottawa, Ont	29.76	30.09	+.07	36.8	+ 5.1	43.8	29.9	1.46	—1.08	2.0
Kingston, Ont	29.72	30.04	.00	41.8	+ 6.8	49.5	34.1	1.53	—1.71	1.9
Toronto, Ont	29.64	30.03	—.01	42.9	+ 7.3	50.3	35.5	1.73	—1.41	7.2
White River, Ont	28.64	29.99	+.01	28.0	+ 7.5	35.6	20.3	3.38	+1.53	15.0
Port Stanley, Ont	29.39	30.05	.00	44.0	+ 7.2	50.7	37.3	1.66	—1.71	5.0
Saugeen, Ont	29.30	30.02	.00	43.0	+ 8.0	50.3	35.6	1.70	—2.00	2.6
Parry Sound, Ont	29.29	29.99	—.02	39.6	+ 7.5	47.3	31.9	2.92	— 1.45	2.8
Port Arthur, Ont	29.24	29.97	—.03	30.7	+ 6.7	37.6	23.8	1.77	+ 0.44	4.8
Winnipeg, Man										
Minnedosa, Man	28.06	29.94	—.10	22.6	+ 5.3	31.1	14.1	0.81	— 0.19	8.1
Qu'Appelle, Assin	27.56	29.87	—.13	22.2	+ 3.4	30.4	13.9	1.05	+ 0.16	10.5
Medicine Hat, Assin	27.55	29.89	—.11	26.3	— 1.1	35.3	17.4	0.80	— 0.12	8.0
Swift Current, Assin	27.26	29.92	—.10	23.3	+ 0.1	31.2	15.5	0.60	— 0.09	6.0
Calgary, Alberta	26.19	29.84	—.14	21.5	— 4.3	30.5	12.6	0.39	— 0.49	3.9
Banff, Alberta	25.15	29.87	—.09	22.5		28.8	16.2	1.68	— 0.59	16.5
Edmonton, Alberta	27.48	29.84	—.13	19.3	— 3.6	28.1	10.6	0.82	+ 0.24	8.2
Prince Albert, Sask	28.27	29.89	—.14	15.2	— 0.2	25.2	5.2	3.06	+ 2.23	30.5
Battleford, Sask	28.12	29.92	—.10	15.3	— 1.0	23.6	6.9	1.26	+ 0.68	12.6
Kamloops, B. C										
Victoria, B. C	29.80	29.90	—.09	44.6	+ 1.4	48.1	41.1	6.15	— 0.82	0.3
Barkerville, B. C	25.44	29.80	—.10	23.7	+ 0.1	29.7	17.6	4.10	+ 0.81	41.0
Hamilton, Bermuda	29.90	30.06	+.01	69.0	+ 0.3	73.3	64.7	2.08	— 2.30	

TABLE VII.—*Heights of rivers referred to zeros of gages, November, 1902.*

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water. Height.	Highest water. Date.	Lowest water. Height.	Lowest water. Date.	Mean stage.	Monthly range.
Mississippi River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
St. Paul, Minn	1,954	14	4.6	23	2.4	1,2	3.7	2.2
Red Wing, Minn	1,914	14	5.8	19,20	1.3	1	3.7	4.5
Reeds Landing, Minn	1,884	12	5.4	19,20	1.5	1	3.4	3.9
La Crosse, Wis	1,819	12	6.9	21,22	2.3	1	4.5	4.6
Prairie du Chien, Wis	1,759	18	7.6	25,26	1.7	1	4.3	5.9
Dubuque, Iowa	1,699	15	7.7	26–28	2.4	1	4.7	5.3
Leclaire, Iowa	1,609	10	4.9	27–29	1.2	1	3.7	3.7
Davenport, Iowa	1,593	15	6.2	28–30	2.4	1–3	4.0	3.8
Muscatine, Iowa	1,562	16	7.2	28–30	3.0	2–4	4.7	4.2
Galland, Iowa	1,472	8	3.8	28–30	1.8	1–5	2.7	2.0
Keokuk, Iowa	1,463	15	7.0	28–30	3.4	2–4	5.1	3.6
Hannibal, Mo	1,402	13	7.9	29,30	4.2	4,5	5.9	3.7
Grafton, Ill	1,306	23	10.6	29	7.6	4	8.8	3.0
St. Louis, Mo	1,264	30	14.8	30	9.4	5	11.8	5.4
Chester, Ill	1,189	30	11.0	30	7.5	6	9.1	3.5
New Madrid, Mo	1,093	34	14.1	30	8.4	8,9	10.0	5.7
Memphis, Tenn	843	33	8.6	1	4.0	10,11	5.4	4.6
Helena, Ark	767	42	14.6	1	7.6	12	9.7	7.0
Arkansas City, Ark	635	42	17.7	30	7.0	14	11.2	10.7
Greenville, Miss	595	42	13.9	30	6.5	14	9.1	7.4
Vicksburg, Miss	474	45	13.1	1,2	5.5	15–17	8.6	7.6
New Orleans, La	108	16	5.8	6	3.6	15	4.3	2.2
James River.								
Huron, S. Dak	210	9	0.5	17,21–23	0.3	1,4,8,10 12,18,29	0.4	0.2
Missouri River.								
Bismarck, N. Dak	1,309	14	2.8	15	0.6	1–7	1.5	2.2
Pierre, S. Dak	1,114	14	1.8	10	—0.1	30	1.0	1.9
Sioux City, Iowa	784	19	5.9	4,11,12 14–18	4.7	30	5.6	1.2
Missouri River—Cont'd.								
Omaha, Nebr	669	18	6.1	20,21	4.8	30	5.7	1.3
St. Joseph, Mo	481	10	3.0	5	1.4	30	2.2	1.6
Kansas City, Mo	388	21	9.1	7	6.9	13	7.8	2.2
Boonville, Mo	199	20	10.1	20	7.7	4,5	8.7	2.4
Hermann, Mo	103	24	9.9	29	6.7	4	8.8	3.2
Illinois River.								
Peoria, Ill	135	14	13.9	16,17	11.9	4,5	13.1	2.0
Youghiogheny River.								
Confluence, Pa	59	10	2.8	26	0.3	11–24	0.7	2.5
West Newton, Pa	15	23	3.8	27	0.4	14,19	0.9	3.4
Allegheny River.								
Warren, Pa	177	14	1.3	29	0.1	20–28	0.2	1.2
Oil City, Pa	123	13	1.5	29,30	0.5	11–20	0.7	1.0
Parker, Pa	73	20	2.2	29	0.5	15–17	1.0	1.7
Freeport, Pa	29	20	3.8	29	1.3	15–20	1.9	2.5
Monongahela River.								
Weston, W. Va	161	18	6.3	26	—1.2	16–18,21,22	0.2	7.5
Fairmont, W. Va	119	25	12.4	26	1.2	12–18	2.3	11.2
Greensboro, Pa	81	18	15.1	26	6.3	18–23	7.2	8.8
Lock No. 4, Pa	40	28	18.0	27	7.4	21–23	8.8	10.6
Conemaugh River.								
Johnstown, Pa	64	7	1.2	1,2	0.7	16–18,22	0.9	0.5
Red Bank Creek.								
Brookville, Pa	35	8	—0.1	28–30	—0.5	1–25	—0.4	0.4
Beaver River.								
Elwood Junction, Pa	10	14	3.5	30	2.4	16–18	2.9	1.1
Great Kanawha River.								
Charleston, W. Va	58	30	8.0	26	5.4	30	6.7	2.6
Little Kanawha River.								
Glenville, W. Va	103	20	6.6	26	—2.6	10–12	—1.2	9.2

TABLE VII.—*Heights of rivers referred to zeros of gages*—Continued.

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
New River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Hinton, W. Va	95	14	3.0	28	1.1	6,17	1.6	1.9
Cheat River.								
Rowlesburg, W. Va	36	14	6.1	26	0.7	21	1.8	5.4
Ohio River.								
Pittsburg, Pa	906	22	9.4	27	4.5	30	6.0	4.9
Davis Island Dam, Pa	960	25	9.6	27	2.6	15-20	3.5	7.0
Wheeling, W. Va	875	36	11.0	28	2.4	17	3.6	8.6
Parkersburg, W. Va	785	36	11.8	29	2.9	15,16	4.4	8.9
Point Pleasant, W. Va	703	39	11.3	30	1.8	15-20	3.3	9.5
Huntington, W. Va	660	50	14.3	30	4.2	17,20,21	6.0	10.1
Catlettsburg, Ky	651	50	14.0	28	1.9	17	4.1	12.1
Portsmouth, Ohio	612	50	14.4	28	3.3	17	5.2	11.1
Cincinnati, Ohio	499	50	15.5	30	4.9	14-16	6.3	10.6
Madison, Ind	413	46	13.4	30	4.1	10-17	5.9	9.3
Louisville, Ky	367	28	7.5	30	2.8	12,13	3.8	4.7
Evansville, Ind	184	35	8.6	30	2.5	15,16	3.9	6.1
Paducah, Ky	47	40	9.4	30	1.9	12-14	3.3	7.5
Cairo, Ill.	1,073	45	17.7	30	9.7	8	11.9	8.0
Muskingum River.								
Zanesville, Ohio	70	20	6.7	19,20,29,30	3.5	8,11,17	6.0	1.2
Scioto River.								
Columbus, Ohio	110	17	2.9	28-30	2.1	1-5	2.4	0.8
Miami River.								
Dayton, Ohio	77	18	3.5	18	0.8	3-8,10	1.6	2.7
Wabash River.								
Mount Carmel, Ill	50	15	7.0	28	2.1	8	4.0	4.9
Licking River.								
Falmouth, Ky	30	25	6.8	25	0.5	5	1.7	6.3
Kentucky River.								
High Bridge, Ky	117	17	14.4	27	9.4	2-17	10.1	5.0
Frankfort, Ky	65	31	10.0	28	5.1	22	6.3	4.9
Clinch River.								
Speers Ferry, Va	156	20	0.9	26	−0.7	17	−0.2	1.6
Clinton, Tenn	52	25	8.5	28	2.7	{3-5,12-14,17	3.7	5.8
Holston River.								
Rogersville, Tenn	103	14	2.8	27	1.4	4-8,13-18	1.7	1.4
French Broad River.								
Leadvale, Tenn	70	15	1.4	27	−1.5	16,17	0.8	2.9
Tennessee River.								
Knoxville, Tenn	635	29	2.8	28	0.4	4,5,17	1.0	2.4
Kingston, Tenn	556	25	4.2	26	1.0	1-18	1.5	3.2
Chattanooga, Tenn	452	33	6.3	28	1.3	1,2	2.3	5.0
Bridgeport, Ala	402	24	4.8	28	0.2	1	1.0	4.6
Florence, Ala	255	16	4.5	30	−0.3	1-5	0.5	4.8
Riverton, Ala	225	25	5.9	30	−1.5	4	−0.1	7.4
Johnsonville, Tenn	95	24	5.8	30	0.4	4-7	1.3	5.4
Cumberland River.								
Burnside, Ky	516	50	23.6	27	1.0	13-15	3.5	22.6
Carthage, Tenn	305	40	15.8	28	−0.4	16	2.9	16.2
Nashville, Tenn	189	40	19.6	30	1.3	14-17	4.1	18.3
Clarksville, Tenn	126	42	20.4	30	1.1	17,18	4.2	19.3
Arkansas River.								
Wichita, Kans	832	10	1.5	{4-6,14-18,22	1.4	{1-3,7-13,19-21,23-30	1.4	0.1
Webbers Falls, Ind. T	465	23	10.5	17	1.8	2	5.0	8.7
Fort Smith, Ark	403	22	14.2	26	2.9	1	6.9	11.3
Dardanelle, Ark	256	21	15.8	26	1.9	1	6.9	13.9
Little Rock, Ark	176	23	17.3	27	3.1	3-5,8,9	7.6	14.2
White River.								
Newport, Ark	150	26	15.4	28	0.2	3,4	3.2	15.2
Yazoo River.								
Yazoo City, Miss.	80	25	4.4	30	−2.1	1-24	−1.4	6.5
Red River.								
Arthur City, Tex.	638	27	23.6	26	4.3	4	13.6	21.3
Fulton, Ark.[2]	515	28	32.1	29,30	6.1	3	18.7	26.0
Shreveport, La	327	29	20.8	30	4.8	4	11.6	16.0
Alexandria, La	118	33	18.2	30	3.7	4,10,11	8.5	14.5
Ouachita River.								
Camden, Ark	304	39	35.9	30	4.5	1-5	15.9	31.4
Monroe, La	122	40	16.2	30	2.6	6,7	6.9	13.6
Atchafalaya River.								
Melville, La	100	31	15.5	30	10.3	20	12.3	5.2
Penobscot River.								
Mattawamkeag, Me.[3]	87	.....	11.5	8	10.4	24	11.0	1.1
Montague, Me	60	.....	.....	.....	.....	.....	.....	.....
Kennebec River.								
Solon, Me	86	.....	2.1	1	0.0	5,6,11-13	0.6	2.1
Winslow, Me	46	.....	5.4	17	4.3	13	5.3	1.1
Merrimac River.								
Franklin Junction, N. H	110	.....	.....	.....	.....	.....	.....	.....
Concord, N. H	94	.....	4.1	1	2.8	24	3.3	1.3
Manchester, N. H	68	.....	4.5	5	1.8	3	3.4	2.7

Stations.	Distance to mouth of river.	Danger line on gage.	Highest water.		Lowest water.		Mean stage.	Monthly range.
			Height.	Date.	Height.	Date.		
Connecticut River.	*Miles.*	*Feet.*	*Feet.*		*Feet.*		*Feet.*	*Feet.*
Wells River, Vt	255	.....	23.9	1,27-29	22.2	10	23.3	1.7
White River Junction, Vt	209	.....	10.0	1	6.1	30	7.0	3.9
Bellows Falls, Vt	170	12	4.8	1	2.1	29	2.8	2.7
Holyoke, Mass	84	9	5.5	1	2.6	26	3.4	2.9
Hartford, Conn	50	13	12.1	1	3.8	24	5.4	8.3
Housatonic River.								
Gaylordsville, Conn	50	15	5.5	1	4.0	25	4.5	1.5
Susquehanna River.								
Binghamton, N. Y	306	16	5.5	1	3.2	19-24	3.6	2.3
Towanda, Pa	262	16	4.2	1	1.5	26	2.1	2.7
Wilkesbarre, Pa	183	17	9.5	1	4.1	23-26	5.2	5.4
Harrisburg, Pa	69	17	5.5	1	1.7	24,25	2.7	3.8
West Branch Susquehanna.								
Lock Haven, Pa	65	12	−1.2	29,30	−2.6	13-26	−2.3	1.4
Williamsport, Pa	39	20	1.9	1	0.8	20	1.2	1.1
Juniata River.								
Huntingdon, Pa	90	24	3.3	27,28	3.0	6-26	3.0	0.3
Shenandoah River.								
Riverton, Va	58	22	−0.1	28-30	−1.0	18-22	−0.7	0.9
Potomac River.								
Cumberland, Md	290	8	4.4	27	1.2	16,17,21,22	1.8	3.2
Harpers Ferry, W. Va	172	18	3.0	28-30	−0.9	10	−0.1	3.9
James River.								
Lynchburg, Va	260	18	2.8	27	−0.1	1-19	0.4	2.9
Richmond, Va	111	12	3.6	27	−0.7	14,15	0.4	4.3
Roanoke River.								
Clarksville, Va	196	12	4.9	20	1.3	17	2.4	3.6
Weldon, N. C	129	30	14.6	28	8.8	14-18	9.9	5.8
Cape Fear River.								
Fayetteville, N. C	112	38	10.0	28	1.7	5,6	3.5	8.3
Edisto River.								
Edisto, S. C	75	6	.....	.....	.....	.....	.....	.....
Pedee River.								
Cheraw, S. C	149	27	13.0	20	1.5	17	3.4	11.5
Black River.								
Kingstree, S. C	52	12	2.2	26,27	0.6	1-5	1.6	1.6
Lynch Creek.								
Effingham, S. C	35	12	3.9	4,26,27	3.0	10,11	3.5	0.9
Santee River.								
St. Stephens, S. C	97	12	7.4	2,3	2.2	17-19	5.1	5.2
Congaree River.								
Columbia, S. C	37	15	3.8	27	−0.2	16	1.1	4.0
Wateree River.								
Camden, S. C	45	24	15.2	19	4.9	16,17	7.2	10.3
Waccamaw River.								
Conway, S. C	40	7	2.8	21	1.3	1	2.2	1.5
Savannah River.								
Calhoun Falls, S. C	347	15	3.9	26	1.6	22	2.3	2.3
Augusta, Ga	268	32	12.0	27	6.9	5	8.1	5.1
Broad River.								
Carlton, Ga	30	11	4.6	26	2.1	4	2.5	2.5
Flint River.								
Albany, Ga	80	20	1.8	1,30	0.1	10,21	0.8	1.7
Chattahoochee River.								
Westpoint, Ga	239	20	5.7	6,26	2.0	1-5	2.9	3.7
Ocmulgee River.								
Macon, Ga	125	18	8.8	26	3.1	14,16	3.9	5.7
Oconee River.								
Dublin, Ga	79	30	5.5	28	−0.2	5,6	1.0	5.7
Coosa River.								
Rome, Ga	271	30	4.8	27	0.2	1-5	1.2	4.6
Gadsden, Ga	144	18	4.9	28	−0.9	13-17	0.0	5.8
Alabama River.								
Montgomery, Ala	265	35	6.3	27	0.1	4	1.8	6.2
Selma, Ala	212	35	7.6	28	0.2	3,5	2.1	7.4
Tombigbee River.								
Columbus, Miss.[2]	303	33	3.5	30	−3.3	1-5	−2.1	6.8
Demopolis, Ala	155	35	9.6	30	−2.4	6	−0.1	12.0
Black Warrior River.								
Tuscaloosa, Ala	90	43	13.9	27	4.8	2,3,10,11	6.0	9.1
Brazos River.								
Kopperl, Tex	369	21	3.8	17	−1.4	1-5	1.9	5.2
Waco, Tex	301	24	16.3	25	2.4	2	6.4	13.9
Booth, Tex	76	39	29.0	26	1.0	1,2	15.2	28.0
Red River of the North.								
Moorhead, Minn	418	26	7.8	18-25	6.7	13,14	7.4	1.1
Columbia River.								
Umatilla, Oreg	270	25	3.1	14-18	2.6	1-9,30	2.8	0.5
The Dalles, Oreg	166	40	3.6	18	1.6	6	2.7	2.0
Willamette River.								
Albany, Oreg	118	20	14.0	20	1.0	1,2	5.8	13.0
Portland, Oreg	12	15	10.4	19	2.3	1	5.3	8.1
Sacramento River.								
Red Bluff, Cal	265	23	24.2	10	0.5	1-3	5.9	23.7
Sacramento, Cal	64	29	16.9	20,21	8.1	5,6	13.1	8.8

[1] Frozen 4 days. [2] 28 days only. [3] 23 days only.

CLIMATOLOGY OF COSTA RICA.

Communicated by H. PITTIER, Director, Physico-Geographic Institute.

TABLE 1.—*Hourly observations at the Observatory, San Jose de Costa Rica, during November, 1902.*

Hours.	Pressure.		Temperature.		Relative humidity.		Rainfall.		
	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	Duration, 1902.
	660+ *Mm.*	660+ *Mm.*	° *C.*	° *C.*	%	%	*Mm.*	*Mm.*	*Hrs.*
1 a. m	3.37	3.40	17.61	17.15	91	92	0.9	2.0	0.83
2 a. m	2.95	2.88	17.48	16.95	91	92	3.2	2.0	2.00
3 a. m	2.61	2.69	17.19	16.76	91	92	0.2	1.1	0.50
4 a. m	2.41	2.53	16.83	16.59	92	92	0.1	0.7	1.00
5 a. m	2.47	2.62	16.71	16.52	92	92	0.1	1.1	1.00
6 a. m	2.73	2.95	16.66	16.36	91	92	.....	2.7	.....
7 a. m	3.09	3.38	16.85	16.63	91	90	.....	1.0	.....
8 a. m	3.41	3.73	18.64	18.56	82	84	1.8	1.2	1.00
9 a. m	3.67	4.12	21.30	20.15	70	78	.....	1.8	.....
10 a. m	3.75	4.16	23.40	22.22	66	72	.....	1.3	.....
11 a. m	3.64	3.98	24.24	23.32	61	70	0.8	2.1	0.50
Noon	3.24	3.53	24.99	23.94	60	70	.....	2.6	.....
1 p. m	2.73	2.91	25.07	24.06	64	70	.....	7.2	.....
2 p. m	2.19	2.33	24.43	23.76	67	72	0.1	14.7	0.50
3 p. m	1.88	1.94	23.75	22.97	69	75	6.6	20.0	2.63
4 p. m	1.90	1.83	22.38	21.90	78	78	21.8	18.7	3.17
5 p. m	2.05	2.06	20.69	20.77	84	83	17.6	19.3	5.34
6 p. m	2.33	2.41	19.89	19.78	86	85	10.3	21.0	6.17
7 p. m	2.74	2.88	19.48	19.04	88	88	7.0	10.8	6.15
8 p. m	3.28	3.39	19.07	18.48	88	89	3.6	8.5	1.83
9 p. m	3.64	3.75	18.78	18.24	89	89	13.4	5.4	2.00
10 p. m	3.93	3.98	18.52	17.90	89	91	2.1	4.9	2.33
11 p. m	3.94	3.96	18.21	17.60	91	91	3.1	2.5	0.50
Midnight	3.80	3.75	17.90	17.31	91	91	1.9	2.4	1.42
Mean	662.99	663.13	20.00	19.44	82	84	.....	.....	.....
Minimum	653.3	659.33	13.7	11.2	40	.....	.....	.....	.....
Maximum	666.3	667.22	30.1	29.0	100	.....	5.0	.....	.....
Total	.....	.....	.....	.....	.....	.....	94.6	154.2	38.87

REMARKS.—At San Jose the barometer is 1,169 meters above sea level. Readings are corrected for gravity, temperature, and instrumental error. The hourly readings for pressure, and wet and dry bulb thermometers, are obtained by means of Richard registering instruments, checked by direct observations every three hours from 7 a. m. to 10 p. m. The thermometers are 1.5 meters above ground and are corrected for instrumental errors. The total hourly rainfall is as given by Hottinger's self-register, checked once a day. Under maximum, the greatest hourly rainfall for the month is given. The standard rain gage is 1.5 meters above ground. Since January 1, 1902, observations at San Jose have been made on seventy-fifth meridian time, which is 0 hours, 36 minutes, 13.3 seconds *in advance* of San Jose local time. The normals for pressure, temperature, and relative humidity have been adjusted to this time; the normal for rainfall in Table 1 and the sunshine observations and normal in Table 2 refer to local time. At Port Limon the hours of direct observation are 8 a. m., 2 and 8 p. m., San Jose local time; the barometer is 3.4 meters above sea level. The means for temperature and relative humidity in Table 4 are obtained from two-hourly readings given by a Richard self-registering thermometer.

TABLE 2.

Time.	Sunshine.		Cloudiness.		Temperature of the soil at depth of—				
	Observed, 1902.	Normal, 1889-1900.	Observed, 1902.	Normal, 1889-1900.	0.15 *m.*	0.30 *m.*	0.60 *m.*	1.20 *m.*	3.00 *m.*
	Hours.	*Hours.*	%	%	° *C.*	° *C.*	° *C.*	° *C.*	° *C.*
7 a. m	2.66	4.81	70	52	21.08	21.42	22.01	21.90	21.76
8 a. m	20.01	16.82	.....	.....	.....	.....	.....	.....	.....
9 a. m	22.98	19.65	.....	.....	.....	.....	.....	.....	.....
10 a. m	20.97	18.29	69	59	21.25	21.42	22.07	21.97	.....
11 a. m	17.97	16.69	.....	.....	.....	.....	.....	.....	.....
Noon	16.41	14.34	.....	.....	.....	.....	.....	.....	.....
1 p. m	16.21	13.40	83	74	21.83	21.66	22.07	21.99	.....
2 p. m	16.06	13.38	.....	.....	.....	.....	.....	.....	.....
3 p. m	11.93	12.11	.....	.....	.....	.....	.....	.....	.....
4 p. m	7.72	9.27	91	81	22.09	21.82	22.11	21.93	.....
5 p. m	3.77	4.68	.....	.....	.....	.....	.....	.....	.....
6 p. m	0.25	0.71	.....	.....	.....	.....	.....	.....	.....
7 p. m	.....	.....	86	76	21.92	21.80	22.05	21.88	.....
8 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
9 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
10 p. m	.....	.....	73	66	21.73	21.75	22.03	21.88	.....
11 p. m	.....	.....	.....	.....	.....	.....	.....	.....	.....
Midnight	.....	.....	.....	.....	.....	.....	.....	.....	.....
Mean	.....	.....	78	68	21.69	21.65	22.06	21.93	21.76
Total	156.94	144.15	.....	.....	.....	.....	.....	.....	.....

TABLE 3.—*Rainfall at stations in Costa Rica, November, 1902.*

Stations.	Height above sea level.	Observed, 1902.		Averages.		
		Amount.	Number of days.	Number of years.	Amount.	Number of days.
	Meters.	*Mm.*			*Mm.*	
Sipurio (Talamanca)	60	.....	.....	2	238	26
Boca Banano	3	361	21	6	296	19
Port Limon	3	458	14	17	275	16
Swamp Mouth	3	.....	.....	4	590	2
Zent	20	308	20	1	385	17
Siquirres	60	.....	.....	3	286	20
Dos Novillos	122	314	19	.....	.....	.....
Guapiles	300	.....	.....	2	656	24
Cariblanco (Sarapiqui)	835	.....	.....	4	801	26
San Carlos	161	301	25	4	504	24
Las Lomas	266	302	17	3	555	19
Peralta	332	.....	.....	4	292	22
Turrialba	620	22	24	7	213	17
Juan Viñas	1,040	.....	.....	6	221	15
Santiago	1,100	114	15	1	337	22
Paraiso	1,336	.....	.....	1	172	15
Cachi	1,020	70	23	1	194	15
Las Concavas	1,337	68	22	1	219	20
Tres Rios	1,300	151	20	12	172	13
San Isidro Arenilla	.....	.....	.....	.....	.....	.....
San Francisco Guadalupe	1,187	99	21	6	175	16
San Jose	1,160	95	19	13	151	14
La Verbena	1,140	129	21	6	230	15
Nuestro Amo	791	.....	.....	6	137	11
Alajuela	950	.....	.....	2	225	11
San Isidro Alajuela	1,346	331	18	1	271	16

TABLE 4.—*Observations taken at Port Limon and Zent, November, 1902.*

Stations.	Pressure.			Temperature.			Relative humidity.
	Minimum.	Maximum.	Mean.	Minimum.	Maximum.	Mean.	
	Mm.	*Mm.*	*Mm.*	° *C.*	° *C.*	° *C.*	%
Port Limon	754.13	759.10	755.61	.....	32.0	25.80	82
Zent	.....	.....	.....	19.0	35.0	26.07	88

Stations.	Cloudiness.	Sunshine.	Rainfall.		Temperature of soil at depth of—		
			Amount.	Number of days.	0.15 *m.*	0.30 *m.*	0.60 *m.*
	%	*Hours.*	*Mm.*		° *C.*	° *C.*	° *C.*
Port Limon	.....	.....	46.0	14	.....	.....	.....
Zent	86	149.54	308.0	20	27.20	27.22	27.23

MEXICAN CLIMATOLOGICAL DATA.

By Señor MANUEL E. PASTRANA, Director of the Central Meteorologic-Magnetic Observatory.

November, 1902.

Stations.	Altitude.	Mean barometer.*	Temperature.			Relative humidity.	Precipitation.	Prevailing direction.	
			Max.	Min.	Mean.			Wind.	Cloud.
	Feet.	*Inch.*	° *F.*	° *F.*	° *F.*	%	*Inch.*		
Chihuahua	4,684	25.18	78.8	27.5	56.7	51	0.69	sw.	.....
Guadalajara (Obs. del. Est.)	5,186	24.88	80.6	41.9	55.9	57	T.	nnw.	.....
Guanajuato	6,640	.....	.....	.....	.....	.....	.....	.....	.....
Leon (Guanajuato)	5,906	24.24	79.0	37.6	60.8	68	0.12	wsw.	.....
Mazatlan	25	29.84	86.2	63.0	76.6	70	0.41	nw.	.....
Merida	50	.....	.....	.....	.....	.....	.....	.....	.....
Mexico (Obs. Cent.)	7,472	23.00	73.4	41.9	58.5	59	T.	se.	se.
Mexico (E. N. Agric.)	7,442	22.99	79.9	46.0	59.9	69	.....	.....	.....
Monterey (Seminario)	1,626	.....	.....	.....	.....	.....	.....	.....	.....
Morelia (Seminario)	6,401	23.89	76.6	39.7	59.9	72	0.09	s.	s.
Puebla (Col. d Est.)	7,118	23.31	75.6	34.5	57.4	68	0.07	e.	.....
Queretario	6,070	24.11	77.4	45.0	61.9	55	0.21	e.	.....
Toluca	8,812	.....	.....	.....	.....	.....	.....	.....	.....
Zacatecas	8,015	22.47	74.5	33.8	55.4	58	0.61	e.	.....
Zapotlan	5,078	25.02	81.3	41.5	64.2	66	0.16	sse.	.....

*The monthly barometric means are reduced to the international standard of gravity.

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• Buckerville

Chart I. Tracks of Centers of High Areas. November, 1902.

Chart I. Tracks of Centers of High Areas. November, 1902.

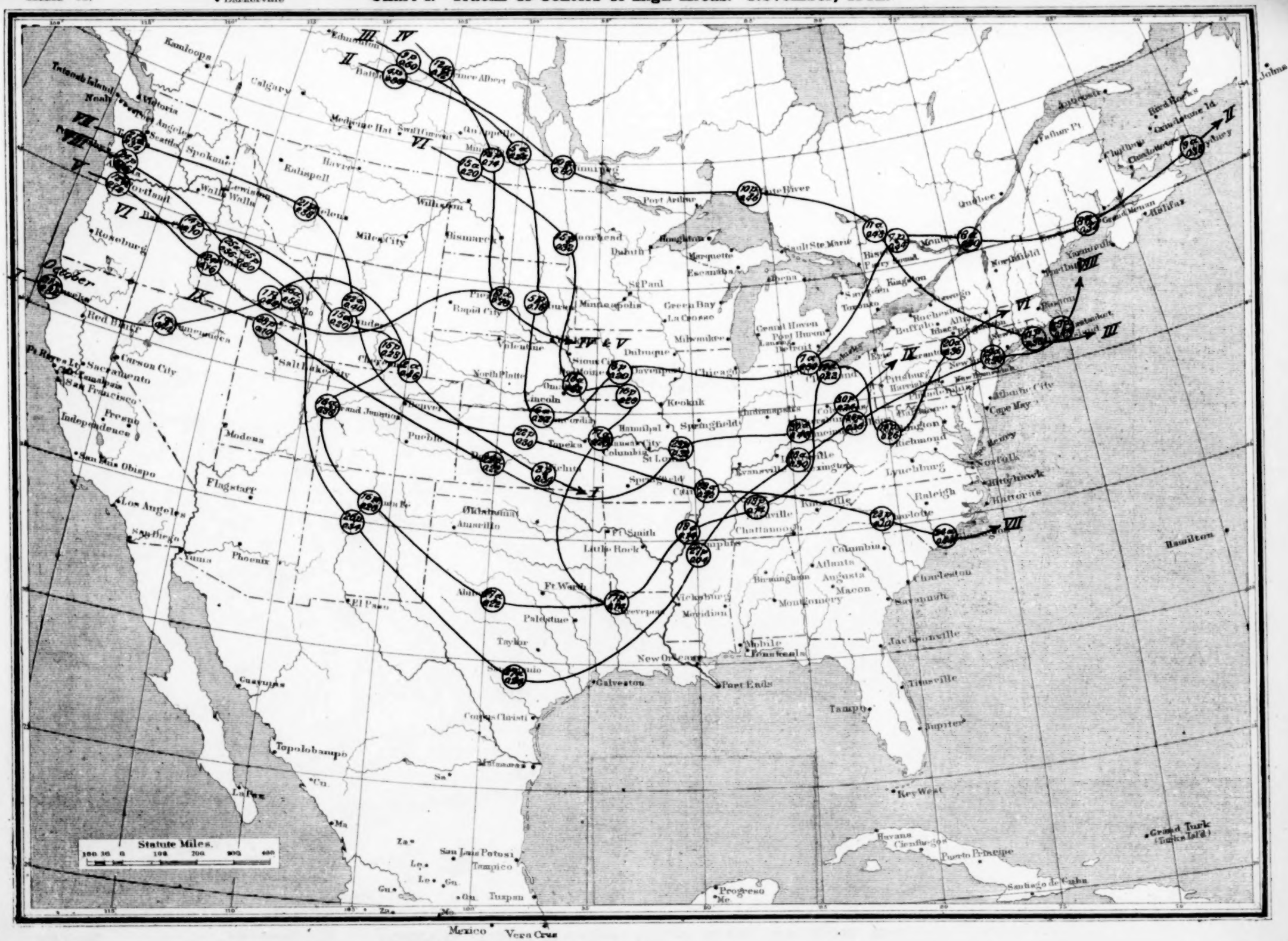

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Chart II. Tracks of Centers of Low Areas. November, 1902.

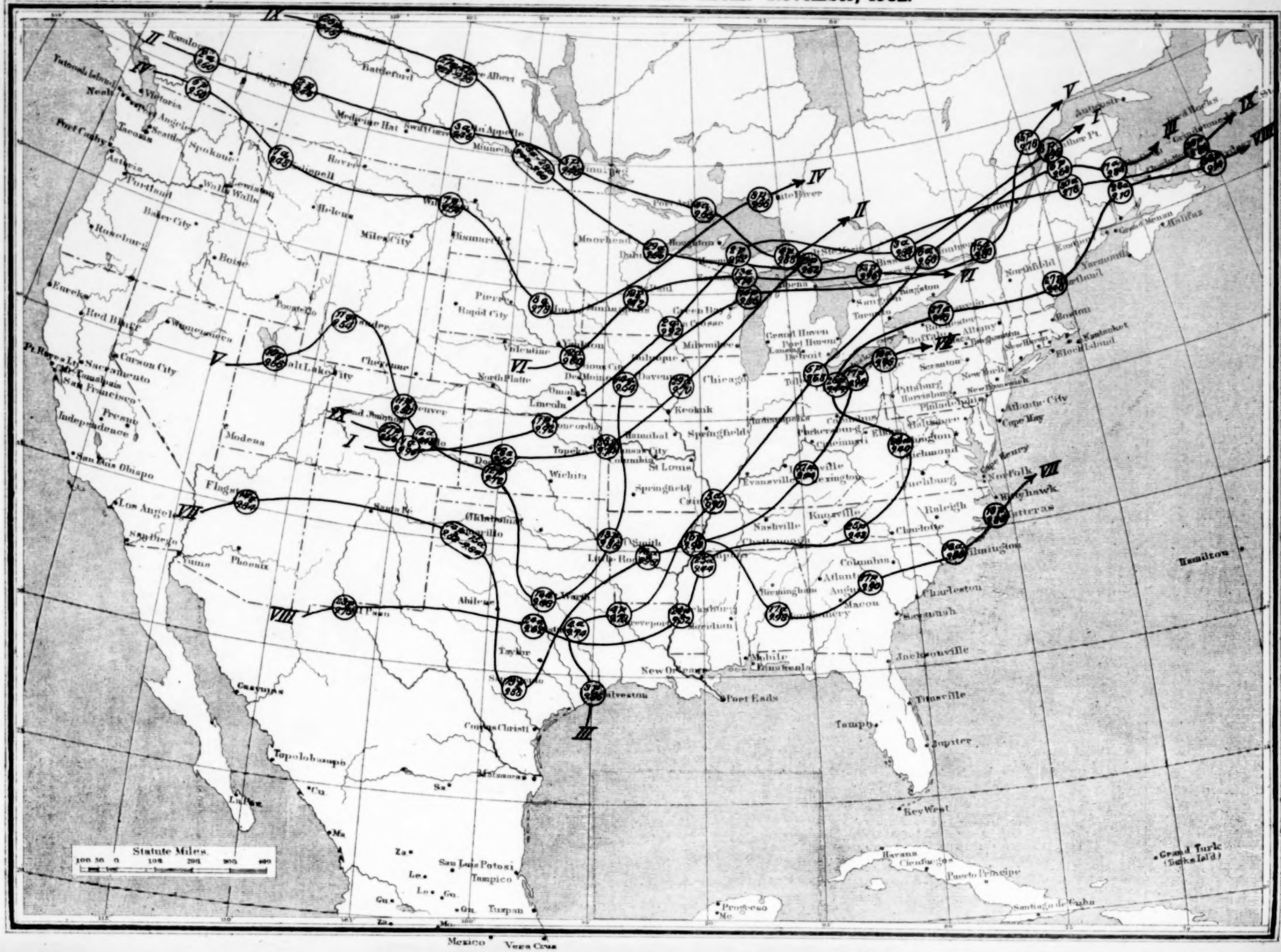
Statute Miles
100 50 0 100 200 300 400
Battleford
Medicine Hat
Swift Current
Minnedosa
Moorhead
Bismarck
Pierre
Rapid City
Valentine
North Platte
Omaha
Lincoln
Kearney
Chicago
Milwaukee
Green Bay
Duluth
Sioux City
Des Moines
Davenport
Dubuque
Toronto
Kingston
Ottawa
Montreal
Quebec
Halifax
Yarmouth
Northfield
Portland
Boston
Nantucket
Block Island
Albany
Buffalo
Rochester
Scranton
New York
Pittsburg
Harrisburg
Philadelphia
Atlantic City
Cape May
Baltimore
Washington
Cincinnati
Parkersburg
Columbus
Indianapolis
Evansville
Louisville
Lexington
Springfield
Hannibal
Kansas City
St Louis
Topeka
Wichita
Dodge City
Denver
Cheyenne
Salt Lake City
Winnemucca
Red Bluff
Eureka
Roseburg
Baker City
Boise
Pocatello
Helena
Miles City
Havre
Medicine Hat
Calgary
Edmonton
Battleford
Prince Albert
Minnedosa
Winnipeg
Port Arthur
Duluth
Marquette
Sault Ste Marie
Parry Sound

Chart III. Total Precipitation. November, 1902.

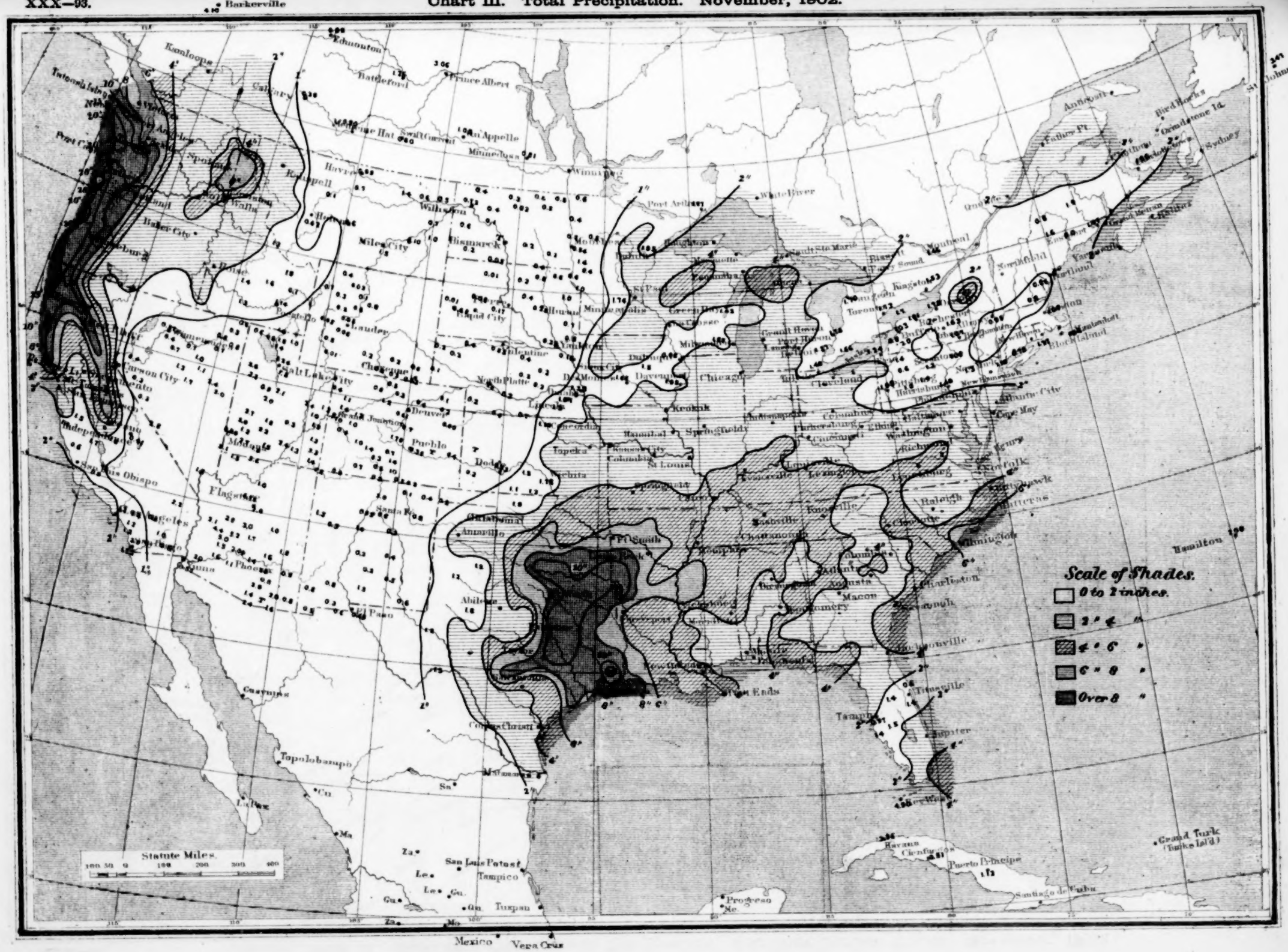

Chart IV. Sea-Level Pressure and Temperature; Resultant Surface Winds. November, 1902.

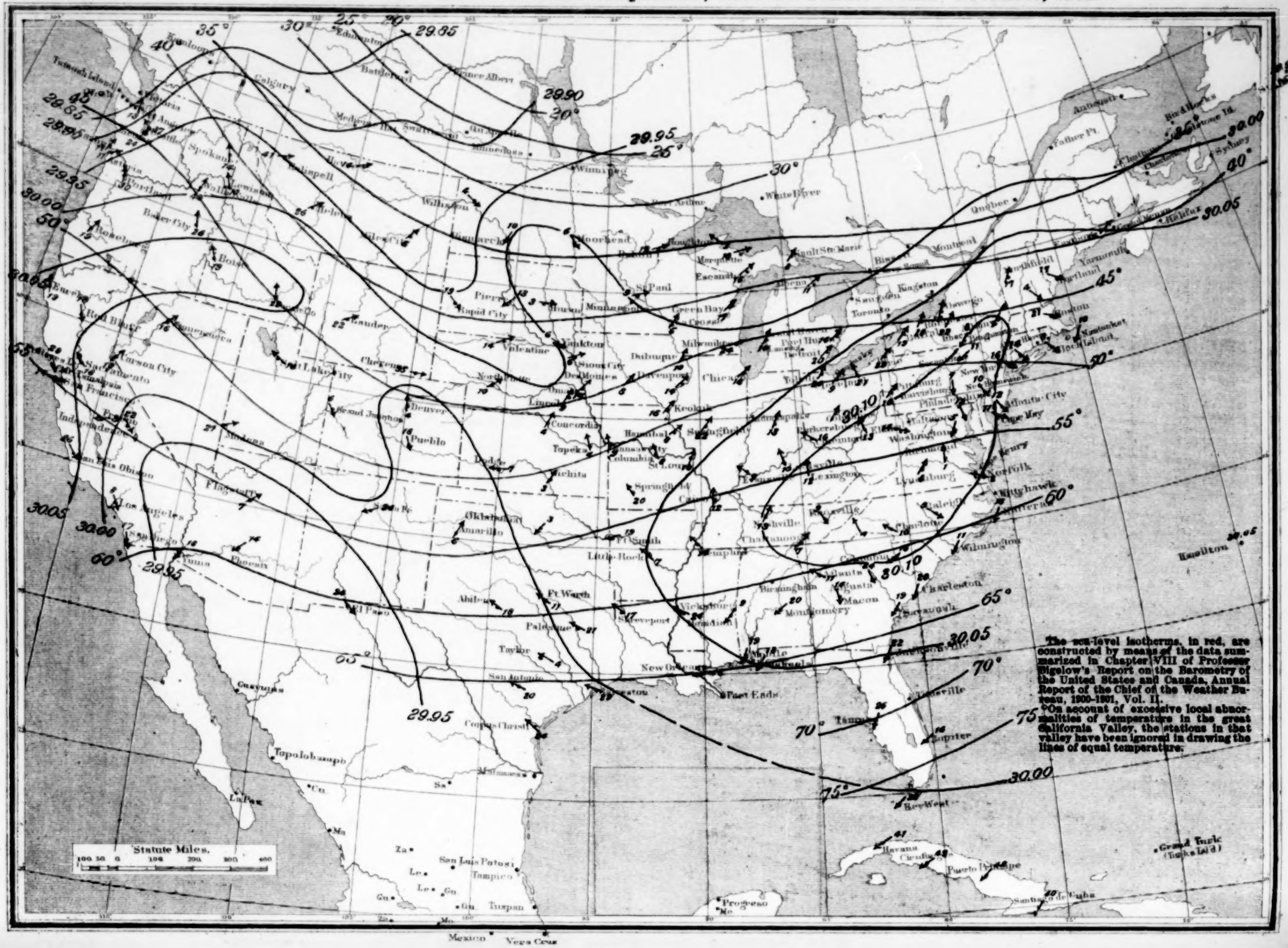

Chart V. Hydrographs for Seven Principal Rivers of the United States. November, 1902.

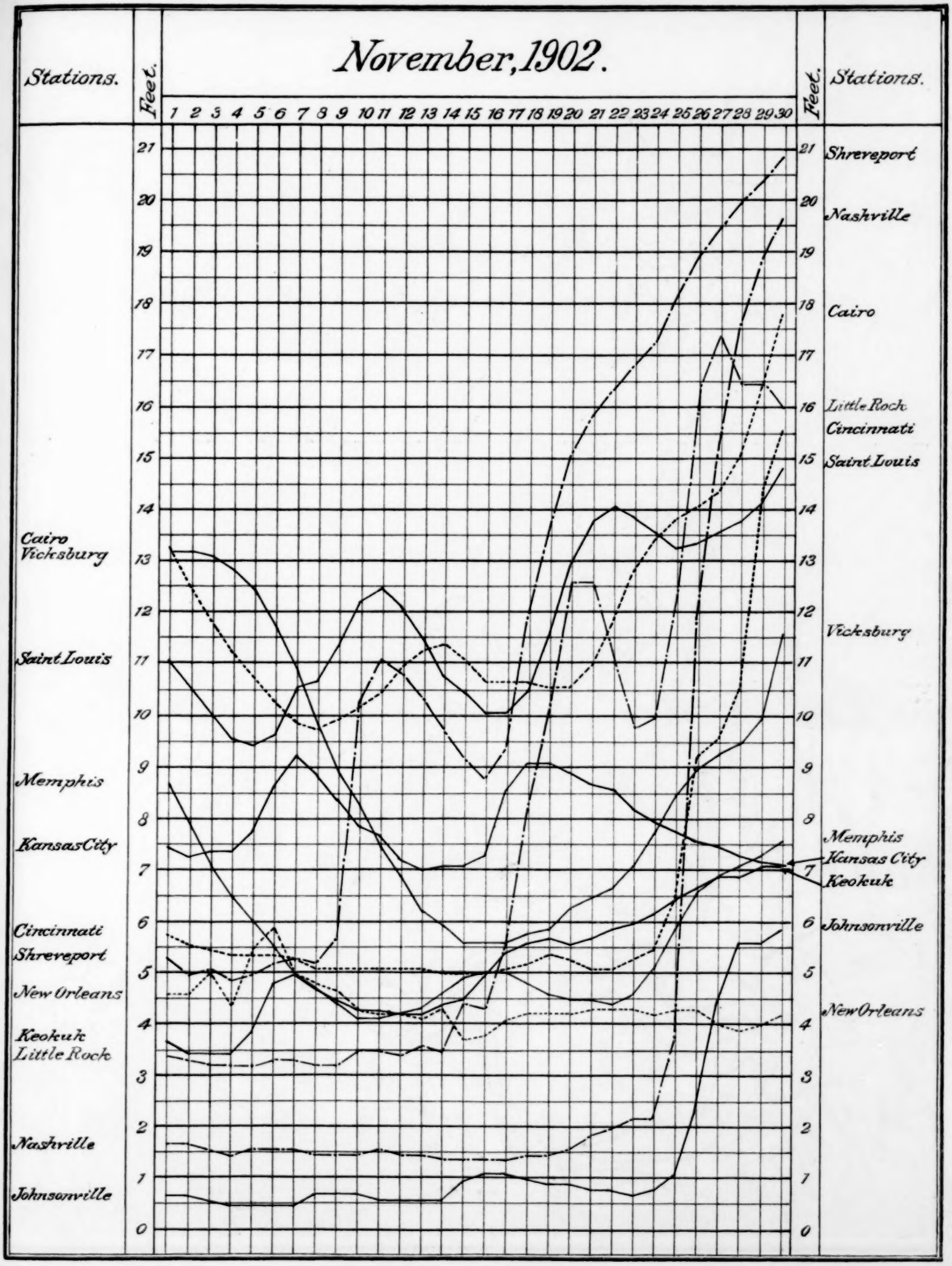

Chart VI. Surface Temperatures; Maximum, Minimum, and Mean. November, 1902.

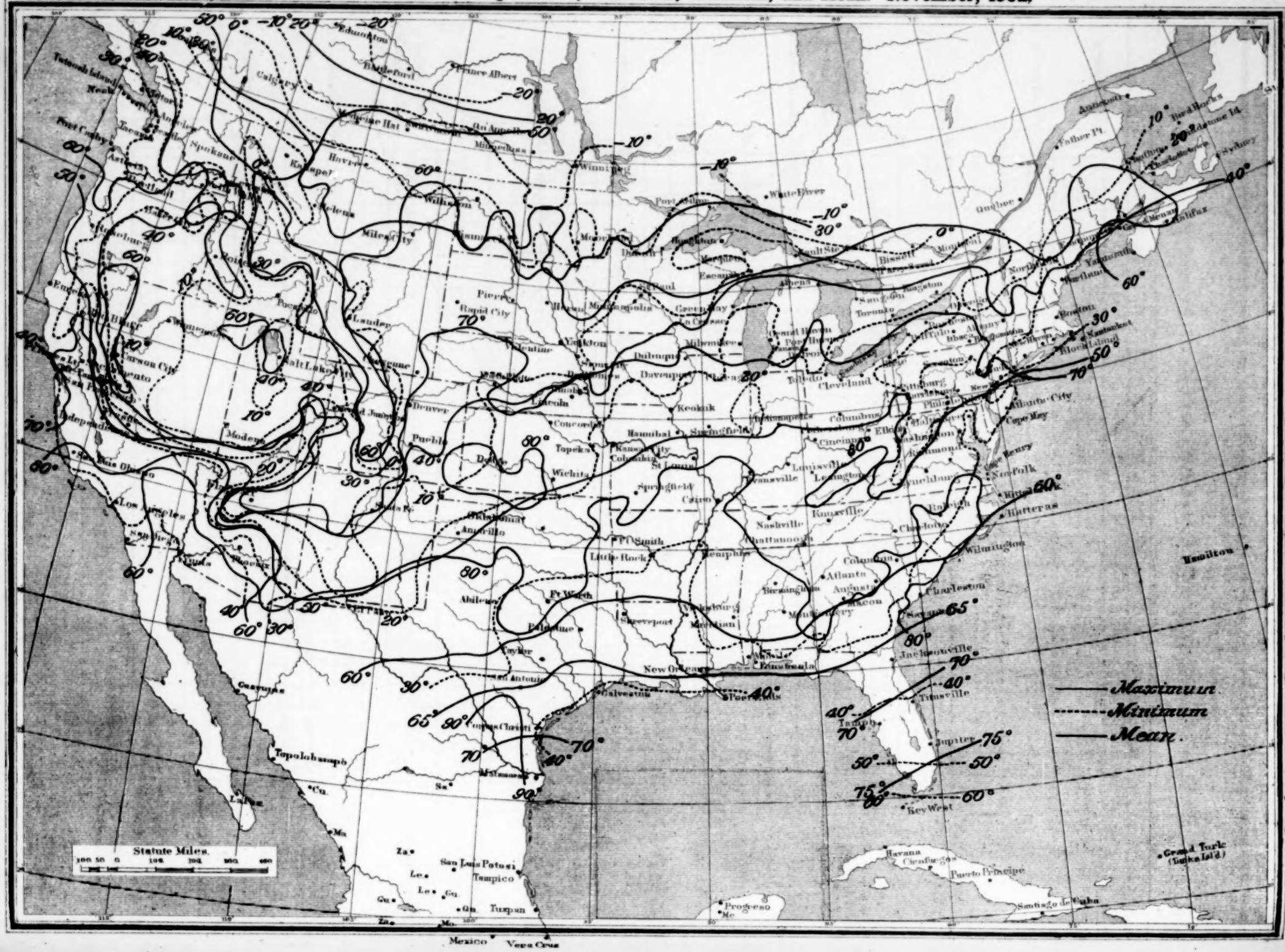

Chart VII. Percentage of Sunshine. November, 1902.

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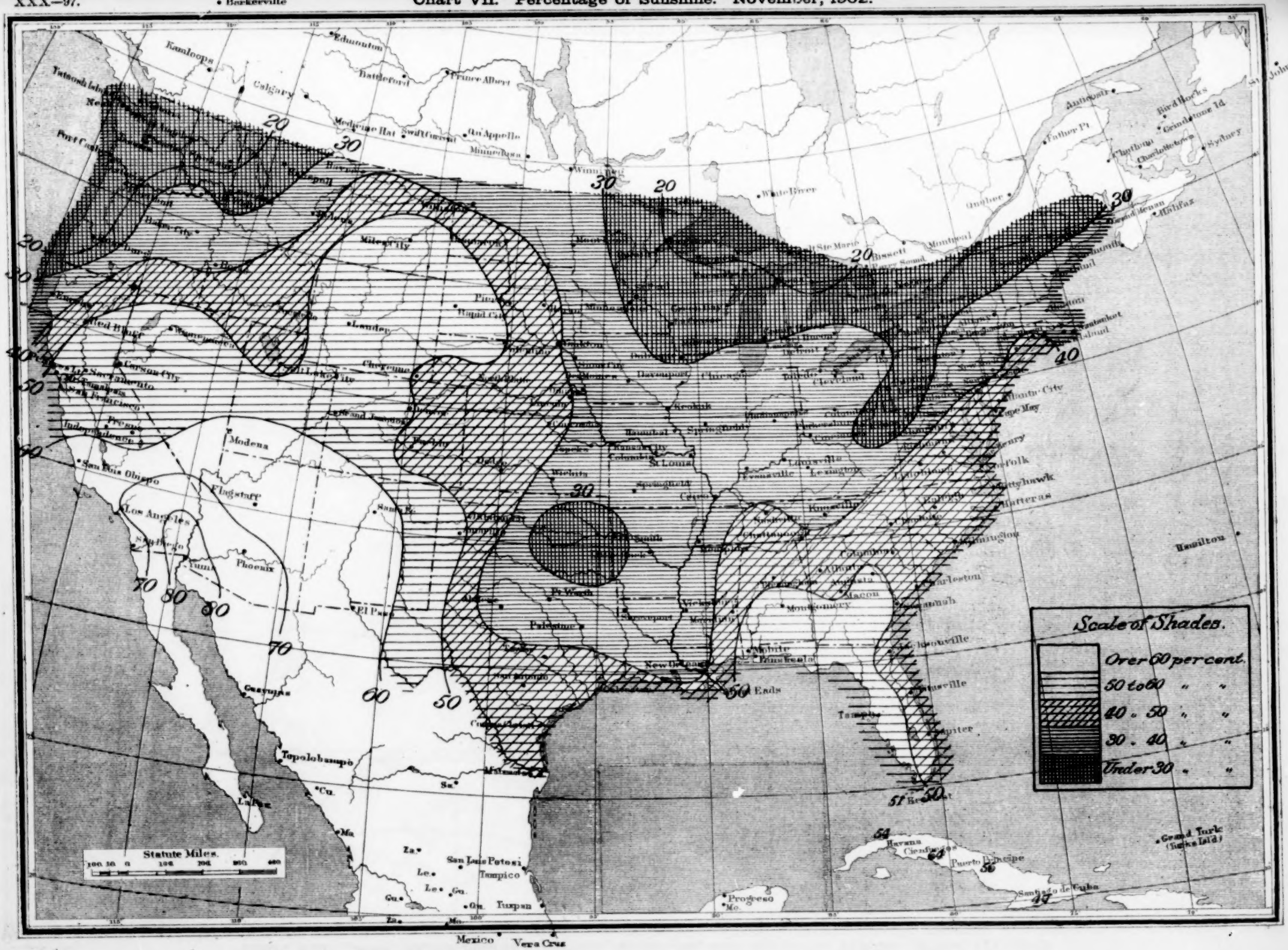
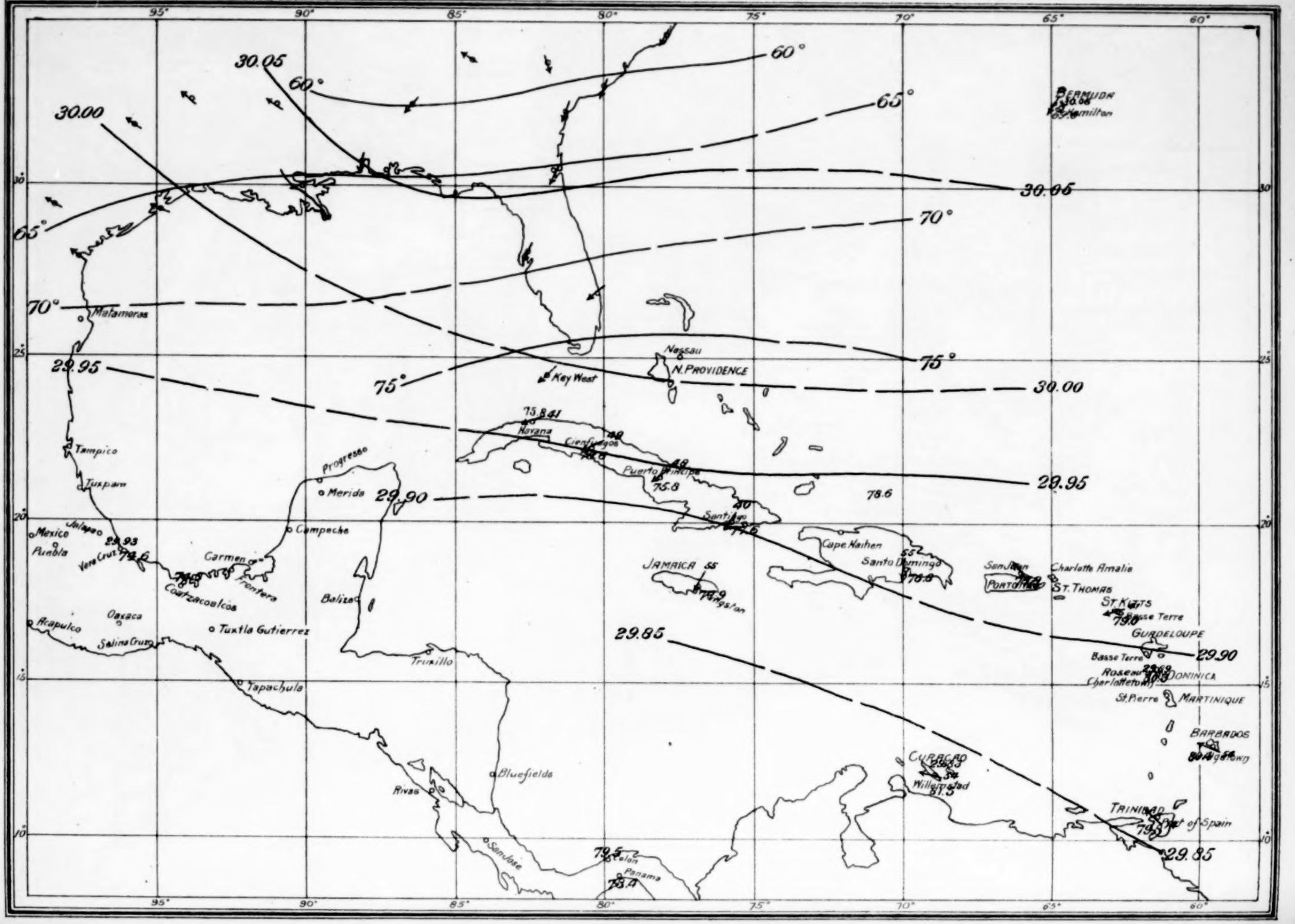


Chart VIII. West Indian Monthly Isobars, Isotherms, and Resultant Winds. November, 1902.



• Barkerville

Chart IX. Total Snowfall for November, 1902.

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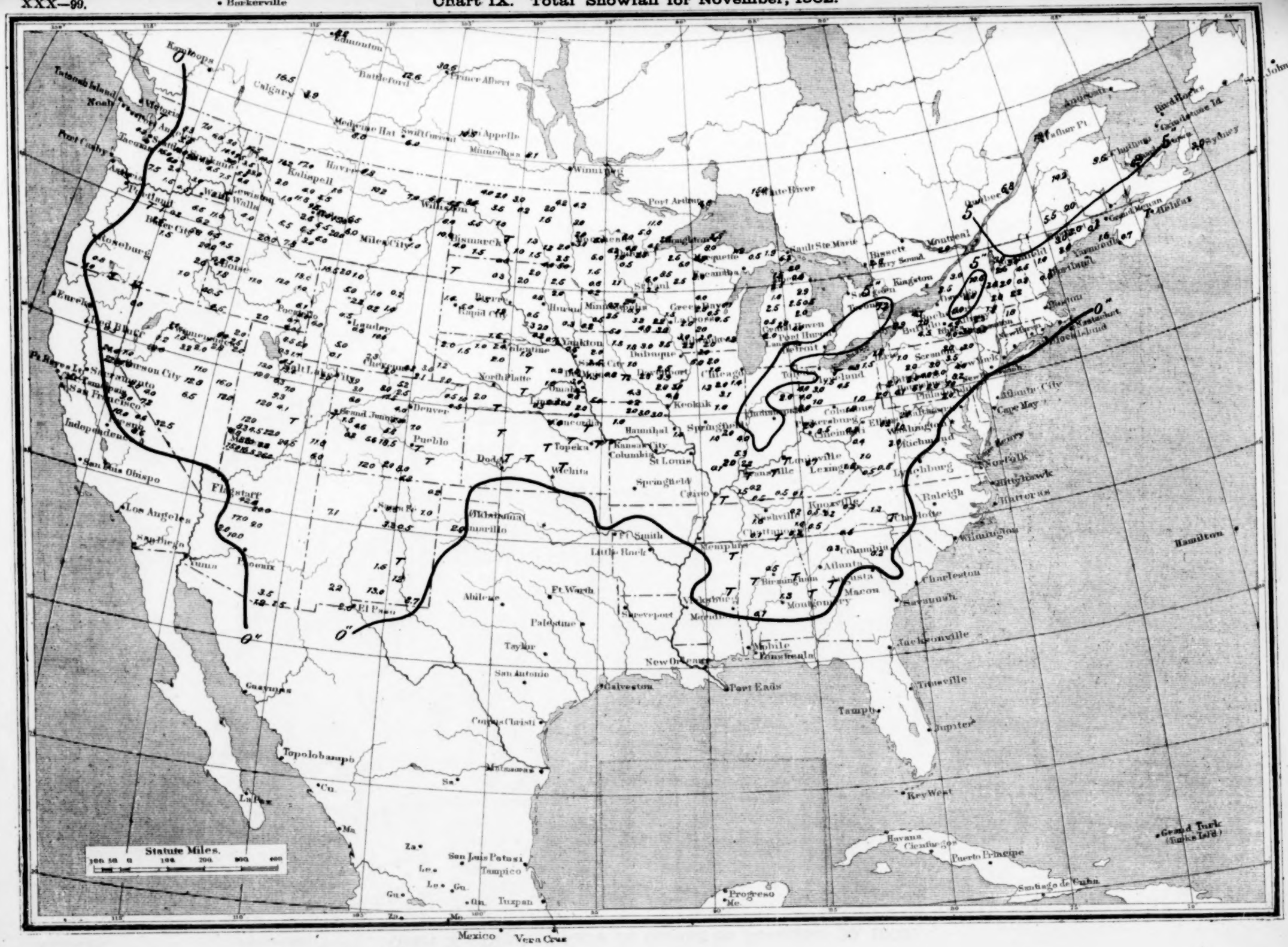

• Berkeley
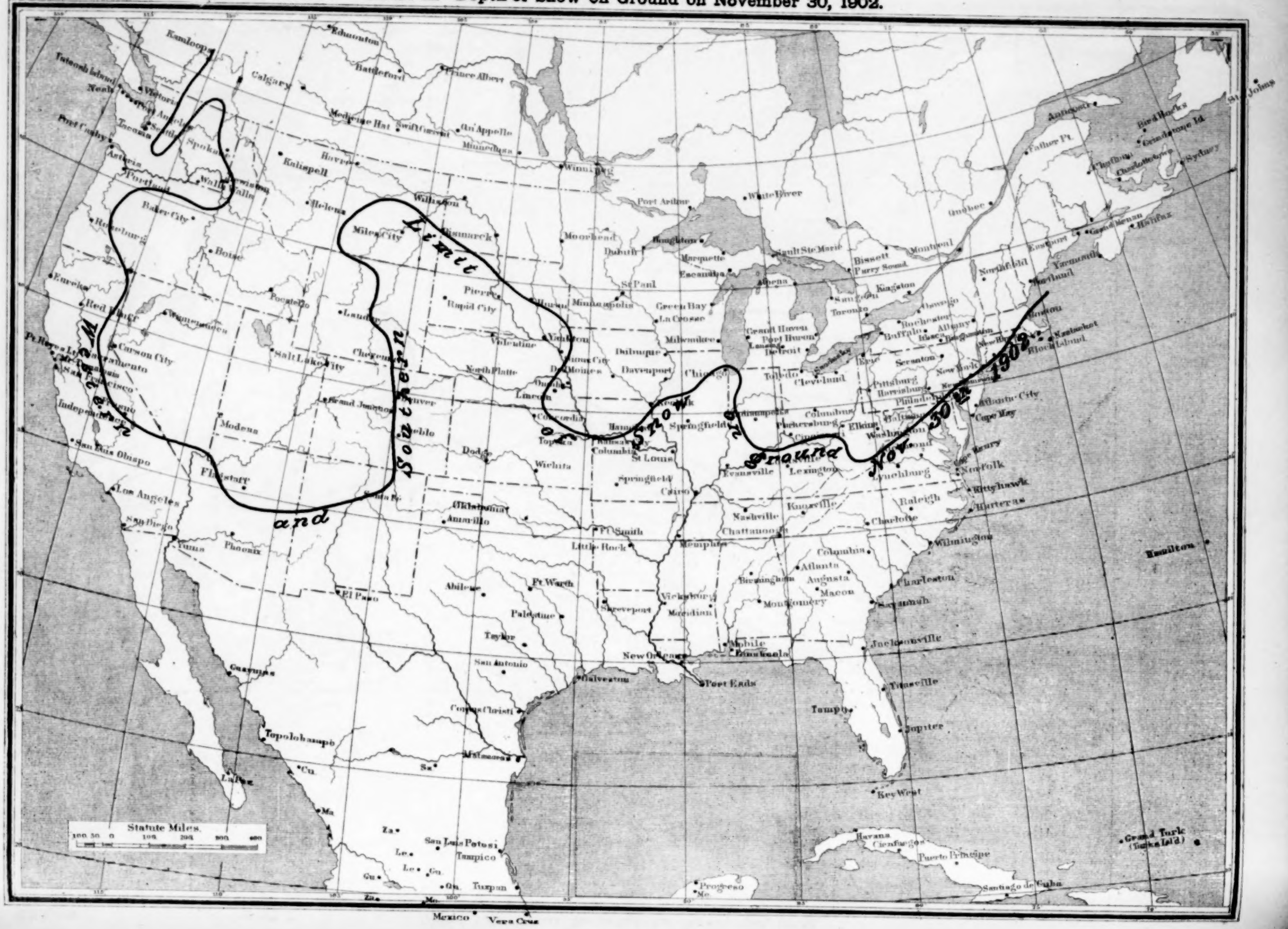
Chart X. Depth of Snow on Ground on November 30, 1902.